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ISIS

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Second Preface to Volume XXVII

Communion with Erasmus

I have often been perplexed by two sayings ascribed to Our Lord in the Gospel according to Saint Luke. The first is "He that is not against us is for us" (9, 50); the second, "He that is not with me is against me" (11, 23). These two sayings are different almost to the point of contradiction. Of course, I realize that it is not impossible for theologians and sophists to harmonize them, but simple honest men do not hesitate to recognize in them two disparate messages. The first is truly a Divine Message, a Blessing, — a message of hope and tolerance, of charity and peace. The other might well be the motto of any dictator, or of any devil in ruthless command of other men; it is a message of intolerance, of hatred, of war.

My reflections on this subject were intensified because of the Erasmus celebrations. Many meetings and exhibitions have been recently organized to commemorate the fourth centenary of his death at Basel in 1536. I have heard or read reports of celebrations which took place in his birthplace Rotterdam, in Basel, in Antwerp, in Anderlecht where he spent some of the happiest months of his life (1). I saw a fine Erasmian exhibition at the British Museum and assume that many other libraries arranged similar ones. Various papers and books on Erasmus were published or republished (2). The most remarkable of these centennial publications is very probably the "Éphéméride illustrée de la vie d'Érasme", a summary of the main facts of his life, skillfully

(1) According to his own testimony. See his letters of 1521 in vol. 4 of Allen's collection. The twenty-two letters which he wrote in Anderlecht have been published in French translation by C. Sobry in a recent number (no. 90, 152 p., July 1936) of *Le folklore brabançon* edited by A. Marinus. Anderlecht, in Erasmus' time a country town, is now included in the greater Brussels.

(2) They will be registered as far as known to us in the Critical Bibliographies of *Isis* in the section XVI(1)E.

put together by DANIEL VAN DAMME, keeper of the "Erasmus house" in Anderlecht, and splendidly illustrated (3).

Now ERASMUS would not have hesitated a moment in accepting the first saying "He that is not against us is for us" as a golden rule, for he was throughout a peaceable man. When his biting wit had the better of his heart, he sometimes indulged in spiteful and cruel remarks (4), yet he was really kind and charitable. Unfortunately, if he was willing to bear up with ideas alien to his own, the world wherein he found himself could not share his toleration, and indeed had no patience with toleration of any kind. To the majority of his contemporaries toleration seemed akin to treason. There could be no compromise with people thinking differently on important subjects. They could conceive only two kinds of men : those who thought like themselves and were "good men" and friends by definition, and those who did not think like themselves and were thus by definition "bad men" and fiends. There was not much difference in that essential respect between the Catholics and the Reformers. They were very much alike in their lack of Christian charity, in the impermeability of their minds to the views of the other side, in their stupidity and savageness. ERASMUS was trying to understand both sides and because of that he was assailed and hated by the extremists of both parties. Thus life was made unbearable for him in Louvain (June 1520), because the doctors of that town took the attitude that they could not be friends with him unless he attacked LUTHER. A few years later (in February 1529) the situation was reversed and life was made unbearable for him in Basel, where the Reformers wanted him to join forces wi.h them and attack their enemies. Once again he had to abandon his quarters and move to another place, this time Freiburg im Breisgau. There is no room left for neutrals and peace-makers, especially when and where they are most needed. However, ERASMUS continued his efforts for mu-

(3) Printed by the Société anonyme de rotogravure d'art, Anderlecht, and published by the Maison d'ÉRASME, 1936 (*Isis* 26, 463). A similar book, at least with regard to the illustrations, and equally precious was EMIL MAJOR : ERASMUS von Rotterdam (*Virorum illustrium reliquiae*, I) 90 p., 32 pl. Basel, FROBENIUS (s.a., 1926).

(4) The "humanists" of that time were remarkably indelicate in their criticisms of their rivals. ERASMUS was gentler than most.

tual understanding and toleration because his conscience drove him to do so, and the fact that he ultimately failed is no discredit to him. Nowhere else does his greatness appear more conspicuously.

***

From the time of his birth at Rotterdam in 1466 to that of his death three score and ten years later, ERASMUS travelled considerably, being indeed a good example of the Wandering Scholar. During the time of his childhood and youth his peregrinations were restricted to the Netherlands, but in 1495 he started on his first journey to Paris, and from that time on there were but few years when he did not travel in France, England, Italy, Switzerland, Germany, or his native country. There are many European scholars of our own days, when travel has become so easy, who have not travelled half as much as this man whose every displacement was made difficult and painful by the lack of convenience and by his own ill health, and who was so often put in jeopardy because of plagues, wars, or the general insecurity of the roads. Indeed plagues and wars did not simply hinder his progress; on various occasions they actually obliged him to run away from a place where he had at last found an asylum, uproot himself once more and try his luck somewhere else. Other causes kept him moving : his love of comfort and independence, his need of books and manuscripts, his craving for genial companions who could share his enthusiasms and sympathize with his regrets, his desire to be close to good printers who could understand his scholarly purposes and help their realization, his periodic wishes for society or else for solitude, his own "Wanderlust" and restlessness aggravated by the vicissitudes of the times. Each and every one of these forces kept him moving from one end of Western Europe to another. The marvel is that in spite of that superficial agitation, he managed to accomplish an amount of work, the recital of which is almost incredible. Not only did he edit many Greek and Latin texts, and write many books, but he kept up an extensive correspondence with a great many of his contemporaries (5). Indeed

(5) *Opus epistolarium* DES. ERASMI *Roterodami. Denuo recognitum et auctum per* P. S. ALLEN (8 vols. Oxford, 1906-34). *Compendium vitae* P. S. ALLEN

his prodigious activity makes every one of us feel like a lazy dwarf.

Moreover that activity was so frequently and so deeply interfered with by the fundamental conflict of that age, the birth and growth of the Reformation, that we must necessarily consider it against that sombre background. ERASMUS, we have said, was neutral; he was trying honestly to remain "au dessus de la mêlée". This does not mean that he was indifferent, far from it. That conflict was always present in his mind, and it is for that very reason that his indomitable patience is so praiseworthy. Toleration was not for him an escape from worry and responsibility; on the contrary, it was the form of duty imposed upon him by his delicate conscience. He was keenly aware of the weaknesses and abuses of the Church, but did not want a revolution which might destroy or dismember it. He wanted reform within the Church and by the Church itself, — the very thing which the Church finally accomplished when it was too late, when the schism, which in ERASMUS's eyes was the greater evil, was already complete and irremediable. Can anybody doubt at present, that is, any impartial outsider, that the Erasmian reform from within would have been better than the Lutheran from without? He wanted correction of the abuses, but above all peace and unity; the Reformers' need of reform was deeper and their indignation with real and imaginary evils stronger, more virulent, and soon beyond the hope of recall or restraint. They created the Reformation with all its fruits, good and bad, but they destroyed the peace of the Church and began its gradual disaggregation. The final rupture between ERASMUS and LUTHER was perhaps unavoidable. The two men were fundamentally opposed. ERASMUS was primarily a humanist and a pacifist, LUTHER a revolutionary. Their philosophies were in conflict, even as their temperaments.

ERASMUS's love of peace did not appear only with respect to the Reformation. As early as 1513, the increasing diffusion of warlike conditions in Europe moved him to write a dialogue against pope JULIUS II who was believed to have caused it, *Julius*

addidit H. W. GARROD (in vol. 8, p. v-xx; portrait). This monumental edition brought fame to the late PERCY STAFFORD ALLEN (1869-1933). It is not yet completed. The latest volume brings the edition down to letter nº. 2356 dated, July 31, 1530.

exclusus (Julius excluded from heaven) (6). He improved every opportunity of showing the stupidity and wickedness of war, e.g., in his *Moriae encomium* (1510/11), in his letter to ANTONY OF BERGEN, abbot of St. Bertin at St. Omer (March 1514) (7), and his *Querela pacis* (1516).

Whether peace was threatened by religious differences, by ecclesiastical wrangles or by clashing greeds and ambitions, ERASMUS's attitude was the same. No controversy or conflict can be finally solved by violent means, he pleaded, for violence is necessarily the source of new evils. In this again ERASMUS was almost alone, and as the years went by and he became older and more infirm, religious and political affairs grew from bad to worse, and he might well have given up the struggle — his own active neutrality — but he did not. The last year of his life was darkened by the loss of two of his best friends : JOHN FISHER beheaded on June 22, 1535, and THOMAS MORE, beheaded a fortnight later, both martyrs of their faith. Can anything durable be built on murder, ERASMUS mused, and we commune with him in his despair.

***

The men who disliked ERASMUS — and who dislike him still — because of his scholarly neutrality have often reproached him for his selfishness (ERASMUS *est pro se*) and for his lack of courage. To be sure he was not a martyr like FISHER and MORE; he was neither a saint nor a hero, though nobody can tell what he would have done if fate had been less kind (or should we say, more kind ?) to him. I believe that he would have stood the supreme test as well as his English friends, if he had been submitted to it. We must honor sanctity and heroism when we witness it, but it is unfair to reproach anybody for the lack of them, and it is foolish to confuse heroism, as is so often done, with sheer violence and

(6) The work was anonymous and ERASMUS denied the authorship of it, but the consensus of contemporary opinion was "Aut ERASMUS, aut diabolus".

(7) *Opus epistolarum* (vol. 1, no. 288, p. 551-54). Dated London, 14 March 1513/4. A German translation of that letter was soon printed (c. 1514). ERASMUS expanded the Latin text into the adage *Dulce bellum inexpertis* (no. 3001 in the FROBEN edition of 1515) which was printed separately in 1516 or 1517 (by FROBEN) and many times afterwards. First English translation of it, London 1533/34.

recklessness. Heroism is generally misunderstood, and most of those whom the people acclaim as heroes are conspicious for the lack of it.

To return to ERASMUS, he had that kind of selfishness peculiar to scholars, which is due not so much to selfcenteredness in the petty sense as to their absorption in their own thoughts (not thoughts of self), their fear of distractions, sometimes their urgent need of solitude. It is pathetic to watch him mistake erudition for faith, overestimate the scholarly aspect of controversies and underestimate the irrational leanings of people. Time after time he failed to perceive the deeper psychological realities which are more often hidden by words than revealed by them. Try as he might he was doomed to remain aloof, for the majority of people are not scholars and judge issues in a way which is unscholarly to say the least. He was a moralist rather than a theologian, and above all a humanist, a defender of the *bonae litterae*. Again it must be admitted that he was ever mindful of his interests and comfort. There was nothing of the ascetic in him (and by the way, very little of the mystic), and remember he was more often ill or ailing than not. Bad food and bad drink made him miserable. While he was residing at Queens', Cambridge, he complained bitterly of the college ale (8); he needed wine, good wine, especially Burgundy, to do his best. He saw to it that flagons of it were sent to him at suitable intervals and was in great anger when they happened to be diverted or interfered with.

Those who blame him for lack of courage can quote his own words, for he admitted his pusillanimity with disarming candor (9). But does that mean that he would have finally betrayed his master or failed in his sacred duty? I have far more confidence in a man who distrusts his own goodness, than in one who indulges in virtuous asseverations and boasting. Fate did not test him and thus there is no way of measuring the depth of his fortitude. I often wonder how many potential but untried heroes and saints are among us: we cannot recognize them but they exist nevertheless.

(8) Letter 226 to his friend ANDREA AMMONIO, Cambridge, August 25, 1511 (ALLEN, 1, 466) : "Ceruisia huius loci mihi nullo modo placet, nec admodum satisfaciunt vina..."

(9) Letter to RICHARD PACE, dean of St. Paul's, dated Brussels, July 5, 1521 (ALLEN 4, 540-42). "Non omnes ad martyrium satis habent roboris. Vereor enim ne, si quid incideret tumultus, PETRUM sim imitaturus."

At any rate ERASMUS was honest; he could not be satisfied with half-truths and equivocations. He loved comfort and honors, but less than truth, less than his own freedom. In August 1535, he might have obtained a red hat from PAUL III, but he preferred to remain independent. He failed to prove himself a hero or a saint, but on the other hand is it not clear that if he had ceased to be neutral he would have been amply rewarded by the side he had thrown his lot with. He had nothing to gain personally and much to lose by remaining faithful to his own duty, and he remained faithful to it unto the end.

***

The kindness of his heart had been obscured by occasional outbursts of sarcasm and cynicism, and by insulting reflections in the rude manner of his time. There is no doubt, however, that that supreme grace had not been denied to him. His last writing, a commentary on Psalm XIV (10) was dedicated, not to one of the great and powerful, but to a humble "publican", CHRISTOPHER ESCHENFELDER of Boppard, who had befriended him when he was traveling along the Rhine seventeen years before. Other instances of his generosity might be quoted, yet it is true that it was moderate like everything else in him. In that sense, one might perhaps say that he was not generous, even as he was not heroic, for he was not extravagantly or conspicuously generous. We must remember that no one is absolutely generous or absolutely mean — the most generous have their moments of paltriness, even as the meanest their glimpses of liberality. ERASMUS, I should think, was far more generous than most men.

***

We cannot probe the depths of his heart and thus there is no means of judging him. Why should we? However, his achievements are tangible enough and whoever he was deep in him, whatever was the temper of his soul, it is our privilege to contemplate the great things which he did. Whoever he was he did so

(10) *De puritate tabernaculi sive ecclesiae christianae*. Printed in Antwerp 1536, and often reprinted.

much for his fellow men, that we should be very grateful to him. He was one of the greatest teachers of the Latin and Greek humanities, sacred and profane, one of the founders of modern learning, above all, a wise humanist who recognized the foibles and the follies of mankind and his own, and could laugh at them as well as denounce them. His scientific culture was very poor, not to say inexistent, but in that respect he was not different from many humanists or pseudo-humanists of our own days, and far more excusable.

He edited many ancient texts, the most important of them being the Greek New Testament. He was actually the first to publish that sacred text in its integrity (Basel 1516) (11). The Greek part of the Complutensian was printed before (1514) but remained unpublished until 1522 (12). ERASMUS' edition was very imperfect and is now negligible, yet its historical importance can hardly be exaggerated. It was the very text which LUTHER translated into German (1522) and TYNDALE into English (1525); it became at once a better authority than the Latin Vulgate. One of ERASMUS's hopes — and in this he revealed his Protestant affinities — was that the Gospels could be read or listened to immediately by every Christian, however humble his station, by the ignorant and the simple-minded as well as by the learned. The fulfillment of such hopes implied a gigantic task — the gradual purification of the text of the Scriptures, its translation into many languages, its explanation and popularization — whereof he did himself a lion's share.

Finally he was one of the apostles of political and religious peace, and of kindliness, at times which were far more troubled than our own, when such ideals of toleration and freedom seemed even less attainable and more chimerical than they do now. He

(11) This includes a Latin translation, a revision of the Vulgate.

(12) Cardinal XIMENES began his great undertaking in 1502. The Latin Vulgate and the Hebrew O. T. were published first, but the Greek N. T., the need of which was not felt, was delayed. ERASMUS's interest in the Greek N. T. began in 1504, but many years elapsed before he undertook the edition of it in earnest. It is possible that FROBEN and he hurried their work in order to anticipate the Complutensian, hence it contained many errors. Later editions were gradually improved : the second in 1519, the third in 1522, the fourth in 1527 (which took the Complutensian text into account); the fifth, 1535, remained authoritative until the nineteenth century.

was not only one of the most perfect humanists of the Renaissance but also, in many ways, one of the founders of European culture (13).

***

When we commune with ERASMUS we cannot help asking ourselves what would have been his attitude in the cockeyed world the vicissitudes of which we are witnessing to-day. Such queries may be futile, but if we evoke him among us they are somewhat unavoidable. To commune with somebody is to try to solve his problems and to consult him for the solution of one's own.

His exemplary moderation should help us to face with equanimity the ominous conflicts of our time. Even as ERASMUS must harden himself to resist the blind fanatics who were imperilling the Church from within as well as the energumens who were menacing it from without, even so we must learn to steer a middle course between the extremists of the right who would jeopardize our freedom, and those of the left who might destroy our traditions. Life without freedom and life without traditions are equally brutish, and it is better not to live at all, than to live like beasts. We may fail in our two-sided struggle even as ERASMUS did, for the passionate, the violent, the vociferous and the ruthless are necessarily much stronger than the gentle and the meek. Yet it is our duty to continue the fight for moderation, wisdom and justice, even as he did. In the end we must win, even as he, who now emerges from the past, quietly but surely triumphant.

There is another lesson which he may give us indirectly. Hu-

(13) In an excellent study on ERASMUS by the great Dutch humanist JAN HUIZINGA (New York, 1924, p. 241), which I read only after my return, I found the following definition of him : "As an intellectual type ERASMUS was one of a rather small group; the absolute idealists who, at the same time, are thoroughly moderate. They cannot bear the world's imperfections; they feel constrained to oppose. But extremes are uncongenial to them; they shrink back from action, because they know it pulls down as much as it erects, and so they withdraw themselves, and keep calling that everything should be different; but when the crisis comes, they reluctantly side with tradition and conservatism. Here too is a fragment of ERASMUS' life-tragedy : he was the man who saw the new and coming things more clearly than anyone else, — who must needs quarrel with the old and yet could not accept the new. He tried to remain in the fold of the old Church, after having damaged it seriously, and renounced the Reformation, and to a certain extent even Humanism, after having furthered both with all his strength."

manism must be catholic and inclusive, rather than exclusive and narrow-minded. ERASMUS was catholic but not enough. He was not sufficiently aware of the scientific efforts of his contemporaries, nor interested in them. To be sure humanists cannot take the whole Republic of Letters for their province, or if they do so, they must do it at their own risk. In general they will fail to do anything fruitful, unless they concentrate their attention on certain problems or groups of problems. Some one will prefer to study Greek, another, Arabic, a third one, organic chemistry or crystallography. Yet the true humanist should never allow himself to be completely shut out from the fields different from his own, especially such fields which are for good or evil essential parts of our culture. I imagine that if ERASMUS were living with us to-day he would realize that as forcibly as we do, for he was so deeply human, and his catholicity, if not complete, extended to the limits of his own knowledge. I am not aware that he excluded anything *a priori* in the manner of a few so-called humanists of to-day, who would gladly put a fence around their own domain and enclose the scientists in another one.

In any case we need not worry about ERASMUS's attitude to science, for there is already in his thoughts, in his life and works, so much that is wise and good and immortal, about which we can and do commune with him.

S. S. Carinthia GEORGE SARTON.
En route from Liverpool to Boston
August 13, 1936.

APPENDIX

ERASMUS' PORTRAIT

There is no man of the sixteenth century, certainly no scholar, whose countenance is better known than that of ERASMUS. He was portrayed by three of the greatest painters of his time : QUENTIN METSYS, HOLBEIN, and DÜRER. HOLBEIN made many portraits of him, the three best known of which (dating all of them from the same year 1523) are kept respectively in the Museum of Basle, in the Louvre, and in Longford Castle. The Basle por-

trait was made for BONIFACE AMERBACH, the Paris one is possibly the one made for Sir THOMAS MORE, the Longford one was probably executed for the Archbishop of Canterbury. For additional information on ERASMUS' portraits see the appendix to HUIZINGA's ERASMUS (New York 1924, 249-57, with bibliography). Many of the portraits, drawings, and medals are reproduced in EMIL MAJOR : ERASMUS (Basel 1926) and DANIEL VAN DAMME's *Éphéméride* (Bruxelles 1936; *Isis* 26, 463).

In my opinion the best of these portraits is the one kept at Longford Castle, the seat of the Earl of Radnor, near Salisbury in Wiltshire. At any rate it touches my heart more deeply than the others for it evokes ERASMUS' kindness as well as his melancholy. At the time when HOLBEIN painted it, ERASMUS was fifty-seven but much older than his years because of his ill health, of the vicissitudes of his life and his unremitting exertions. The inscription on the edge of the book placed in front of him (in that portrait) *HPAKΛEI ΠONOI* refers to one of his adagia (nº. 2001) and to his own Herculean labor.

There is still another portrait by HOLBEIN, or ascribed to him, which I had hoped to be able to reproduce in *Isis*, for it is far less known than the others, and less likely to be known, as it is jealously guarded in an American country house. One may find a reproduction of it on pl. 11 of MAJOR's book. It is of small size (18,7 × 14,5 cm.); it was painted at Freiburg i. B. in 1531 or perhaps a year or two later. In 1531, ERASMUS was 65. It is now in the possession of the New York banker, Mr. PIERPONT MORGAN, and is hanging in his country house. In a letter dated April 9, 1937, I was assured "that it was not convenient to have the picture removed to be protographed".

NOTES EXPLAINING THE ILLUSTRATIONS

FIG. 1. Title page of the first edition of the *Moriae encomium*. The copy recently acquired for the British Museum from which this photograph was taken was described in the *Annual report, 1935-1936, of the Friends of the National Libraries*, London 1936, p. 16-17, pl. 2.

The *Moriae encomium* is certainly ERASMUS's masterpiece, the one book by means of which he conquered popular fame. He

composed much of it on his way back from Italy across the Alps and wrote it soon after his return during a fever of genius, in the house of his friend Sir THOMAS MORE in Bucklersbury (city of London), in the summer of 1509. (Moriam lusimus apud THOMAM MORUM tum ex Italia reversi). Two editions appeared in Paris, the one (of which we reproduce the title page) bearing the imprint of GILLES DE GOURMONT, the other bearing the imprint of JEAN PETIT. These two editions are otherwise identical, and were printed at the same time. They may be considered as first "ex aequo".

Both are certainly anterior to the first dated edition, dated Strasbourg, August 1511; both are certainly posterior to the date of composition, summer 1509. This in spite of the fact that in JOH. FROBEN's edition of 1522 the date of the first edition is given (presumably by ERASMUS himself) as 1508, but the dates quoted by ERASMUS are often erroneous. The real date of the double undated edition is 1510 or 1511.

The immediate success of the work may be judged from the fact that four editions were published in less than two years, or five, if the double-first be counted as two (i.e., 2 or 3 in Paris, 2 in Strasbourg, before October 1512).

FIG. 2. First English edition of *The praise of folie* (London 1549). The translator was Sir THOMAS CHALONER the elder (1521-65), diplomatist and author. HOLBEIN painted his portrait (DNB 9, 457-58, 1887).

The *Moriae encomium* had been printed in French and in German as early as 1520.

FIG. 4. This second edition of the *Querela pacis* is part of a collection of writings by ERASMUS and THOMAS MORE published by FROBEN in Basel 1517. The *Querela pacis* is the best known of ERASMUS's pacifist writings. Judging by the number of editions, it enjoyed considerable popularity. Thirty-six editions are listed in FERDINAND VANDER HAEGHEN's bibliography (Ghent 1893); these editions were not only in Latin but also in German (1521), Spanish, Dutch, English and French.

According to VANDER HAEGHEN the first edition of the *Querela pacis* appeared in Basel 1516; I have not seen it.

Fig. 1. — Title page of the first edition of ERASMUS's masterpiece. Undated, Paris, 1510 or 1511. See note in fine.

Courtesy of British Museum.

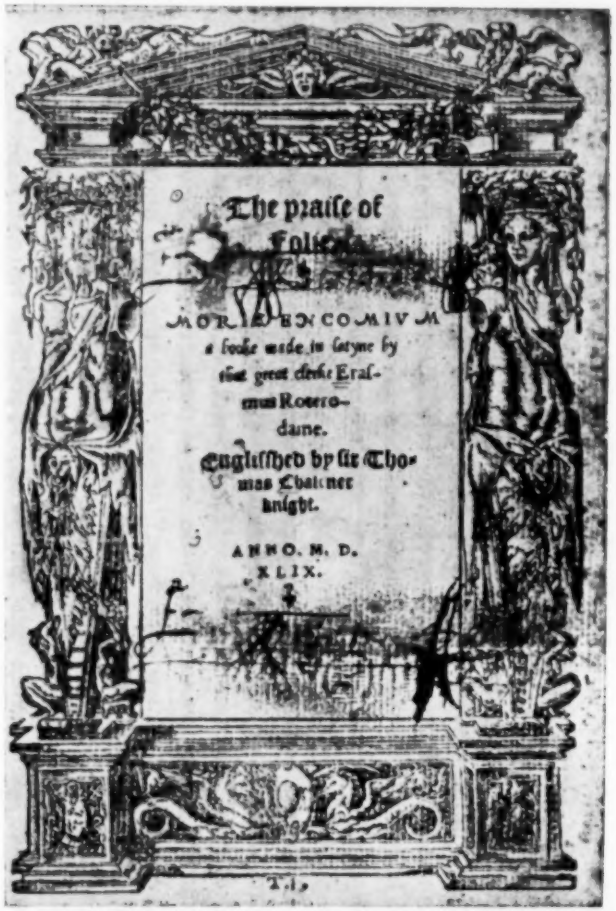
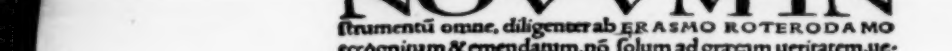


Fig. 2. — Title page of the first English edition of ERASMUS's masterpiece, London 1549. See note in fine. The words "The praise of" are 32 mm. long.

Courtesy of Harvard Library.



masterpiece, London 1549. See note in fine. The words "The praise of" are 32 mm. long.

Courtesy of Harvard Library.

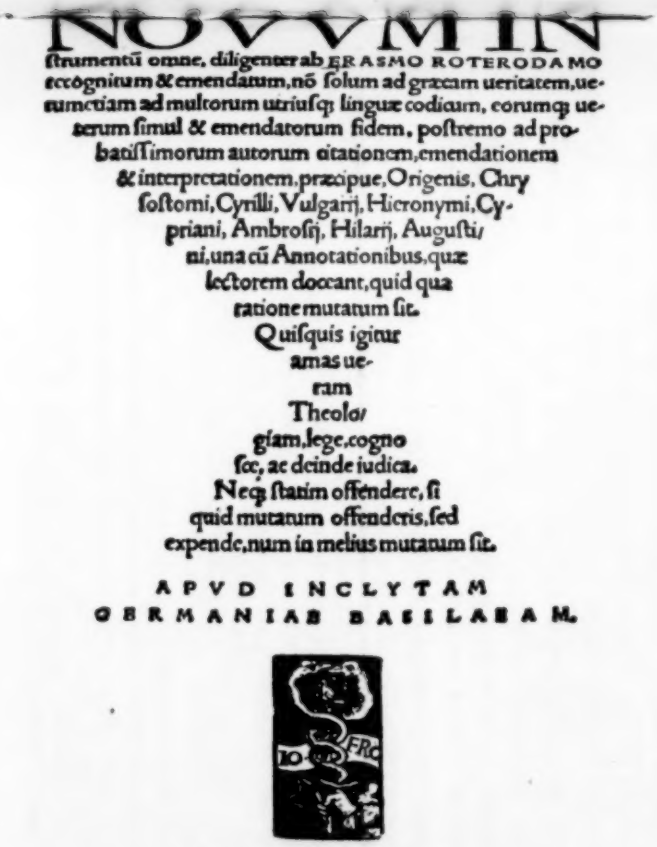

NOVVM IN
strumentũ omne, diligenter ab ERASMO ROTERODAMO
recognitum & emendatum, nõ solum ad græcam ueritatem, ue-
tum etiam ad multorum utriusq; linguæ codicum, eorumq; ue-
terum simul & emendatorum fidem, postremo ad pro-
batiſſimorum autorum citationem, emendationem
& interpretationem, præcipue, Origenis, Chry
ſoſtomi, Cyrilli, Vulgarij, Hieronymi, Cy-
priani, Ambroſij, Hilarij, Auguſti-
ni, una cũ Annotationibus, quæ
lectorem doceant, quid qua
ratione mutatum ſit.
Quiſquis igitur
amas ue-
ram
Theolo-
giam, lege, cogno
ſce, ac deinde iudica.
Neq; ſtatim offendere, ſi
quid mutatum offenderis, ſed
expende, num in melius mutatum ſit.
APVD INCLYTAM
GERMANIAE BASILEAM.
CVM PRIVILEGIO
MAXIMILIANI CAESARIS AVGVSTI,
NE QVIS ALIVS IN SACRA ROMA-
NI IMPERII DITIONE, INTRA QVATV
OR ANNOS EXCVDAT, AVT ALIBI
CVSVM IMPORTET.

Fig. 3. — Title page of the first printed edition of the Greek New Testament (folio, Basel 1516). Edition prepared by ERASMUS, together with a revision of the Latin Vulgate. The first line "Novum in" measures 114 mm.

Courtesy of Harvard Library.

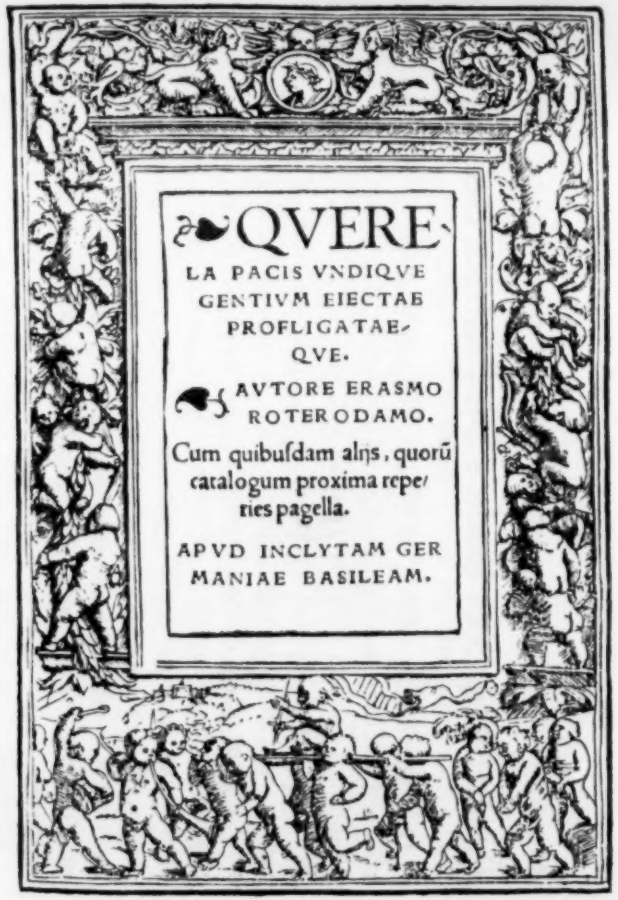

QVERE-
LA PACIS VNDIQVE
GENTIVM EIECTAE
PROFLIGATAE-
QVE.
AVTORE ERASMO
ROTERODAMO.
Cum quibuſdam alijs, quorũ
catalogum proxima repe-
ries pagella.
APVD INCLYTAM GER
MANIAE BASILEAM.

Fig. 4. — Second edition of the *Querela pacis*, Basel 1517. The width of the outermost frame at the top is 120 mm. See note in fine.

Courtesy of Harvard Library.

Manuscripts of Bede's De Natura Rerum

In preparing an edition of BEDE's computistical works I have changed the customary grouping and excluded *De Natura Rerum*, although it appears with *De Temporum Ratione* and *De Temporibus* in BEDE's list of his own works (1), in the great majority of manuscripts, and in all printed editions. (2) It is to be hoped that a new edition of *De Natura Rerum* will be prepared, for all readily available texts are reprints of the first folio edition (3); the editor, HERVAGIUS, unquestionably used an inferior manuscript, as he did in the computistical works. For accurate reference either SICHARDUS, who used an unknown manuscript of French type, or NOVIOMAGUS, who used Cologne MS., 103 (*saec.* ix), is better authority.

However, in consulting the manuscripts of *De Temporibus* and *De Temporum Ratione*, I inevitably examined the bulk of available manuscripts of *De Natura Rerum*, and I present a list of these manuscripts to serve until a new edition; it will act as a guide to check and supplement catalogues which are often misleading and too frequently inaccurate. I include in the list only manuscripts I have personally examined, but all ninth-century manuscripts I know are *included* with the exception of the Goerres manuscript mentioned below and *Vienna 387*, *Melk G 32*, and *Angers 477* (*).

(1) *Hist. Eccl.*, 5, 24 (ed. PLUMMER I, 359).

(2) The contemporary editor can best treat *D. N. R.* and BEDE's commentary on Genesis together, for they are both involved in problems of hexaemeral interpretation. My edition will include *D. T. R.*, *De Temp.*, the letters to VICTHEDE, PLEGUIN, and HELMWALD, the pseudo-Anatolian *Canon Paschalis*, pseudo-MURINUS, and an unpublished commentary on *D. T. R.* (by HEIRIC of AUXERRE?).

(3) Only three independent printed editions have been issued: J. SICHARDUS, *Bedae de natura rerum et temporum ratione*, Basle, 1529; J. NOVIOMAGUS, *Bedae opuscula complura de temporum ratione*, Cologne, 1537; J. HERVAGIUS, *Bedae opera omnia*, tom. I, Basle, 1563.

(*) I am indebted for assistance to Dr. H. H. KING, of the Cornell University Library, and to Professor M. L. W. LAISTNER.

1. Amiens, 222 (*saec.* ix, from Corbie), fols. 19r-27r. "Versus Bedae prbi." Quatrain and *capitula*. Heavy glosses.

2. Berlin, Preuss. Staatsbibl., *128, Phill. 1831* (before 818, Verona-Metz), fols. 91r-99v. "Versus baeda presbiteri." Quatrain. "Capitula libri de naturis rerum."

3. Berlin, Preuss. Staatsbibl., *130, Phill. 1832* (*saec.* ix^{ex}, Metz), fols. 1r-9r. Quatrain. "De natura rerum capitula haec sunt." "De quadrifario dei opere ex opusculis augustini epi." Heavy glosses.

4. Bern, *285* (*saec.* xii, Fleury?), fols. 99v-109r. "Verssus bede prbi. in libro dae natura rerum." Quatrain. No *capitula*. Chs. not numbered.

5. Bern, *610* (*saec.* x), fols. 47v-69v. "Incipit liber ii. De temporibus et momentis." This is BEDE's *De Temp.* Chs. 1-13, followed by *D. N. R.* with chapters numbered 14-65 (fols. 52v-69v) beginning : "xiiii operatio divina quae scla. creau. et gubernat quadriforma rationem distinguitur."

6. Besançon, *186* (*saec.* ix), fols. 26r-32r. Incomplete. Starts with Ch. 8, "De aquis calestibus," and many pages are partially illegible because of tears and stains.

7. Brussels, Bibl. Royale, *9837-9840* (*saec.* xii), fols. 1r-8r. "Item versus eiusdem bedae de sequenti opere." Quatrain. "Incipiunt capitula in libro de temporibus edito a venerabili beda prbo." *Capitula*. "Incipit liber venerabilis Bedae prbi. de natura rerum." Evidently a direct copy of item *48*.

8. Brussels, Bibl. Royale, *9932-9934* (*saec.* xi, S. Laurentius in Liége), fols. 1v-12r. "Versus Bedae Presbiteri." Quatrain and *capitula*. Source-attributions in titles. "Fxplicit liber de naturis rerum."

9. Chartres, *19* (*saec.* x), fols. 87v-94v. No title. "Finit liber primus." Apparently from an exemplar where *De Temporibus* was *liber secundus*. In this MS. *De Temp.* is missing and *De Temp. Rat.* is on fols. 16r-87r.

10. Chartres, 70 (*saec.* ix), fols. 72r-73r. Begins in Ch. 44 : "- ut vinculis discurrentibus -", and continues to end : "Explicit liber de naturis rerum."

11. Cologne, Dombibl., *103* (*saec.* ix), fols. 23v-35r. The basis for NOVIOMAGUS' edition, mentioned above.

12. Geneva, Bibl. de la Université, *50* (804? Massai), fols. 24r-32r. Fol. 24, containing the quatrain, *capitula*, and odd computistical statements, is in a definitely later hand. Fol. 25 begins Ch. 1 without rubrics.

13. Karlsruhe, *Reichenau 167* (before 848), fols. 18r-23v. No incipit. Quatrain and marginal and interlinear glosses, partly in Irish. Source-marks in chapter-titles. Irish script. J. M. CLARK (*Abbey of St. Gall*, p. 52) incorrectly cites ZIMMER (*Glossae Hibernicae*) as saying MS. was

written in Ireland. "Possibly at Peronne" —*Pub. Pal. Soc.*, N. S., I, 34. It may have been written at Reichenau, for its influence is immediately felt in St. Gall manuscripts (St. Gall MS., *248* [*saec.* ix] is indebted to it). At all events it was unquestionably in the possession of Reichenau in the ninth century.

14. London, B. M., *Cotton Tiberius E IV* (*saec.* xii/xiii, Winchcombe), fols. 125^{v}-131^{v}. Exemplar for *15*. Described in the COTTON (1802) catalogue as burned beyond use, but beautifully repaired. Rubrics are virtually all illegible and margins are burned into the text, but it combines with *15* to form a single important testimony. Glosses and diagrams.

15. London, B. M., *Egerton 3088, Beatty 59, Phill. 12,200* (*saec.* xiii, Dore Abbey), fols. 68^{v}-76^{v}. Copy of *14*. "Versus Bede in librum de natura rerum quem ex libris plinii scdi. excerpsit." Quatrain. Source-marks (see discussion below). Cf. SOTHEBY'S Sale Catalogue, May 9, 1933, pp. 95-97 (with two fascimiles). I take this opportunity to add to MILLAR'S comprehensive description, *A Library of A. Chester Beatty*, London, 1930, II, 65-70 : (1) The inserted figures, tables, etc., in BEDE'S works are also found in Oxford MS., *St. Johns 17*; Bodleian, *Auct. F. 3. 14*; Cambridge, *St. Johns 221*; British Museum, *Cotton Tiberius E IV*. Bede's *Ep. ad Vict.* (*Pat. Lat.* XC, 599-605) is here found as *De Temp. Rat.*, Ch. 66, making the work 73 chs., instead of 72. The only other MS. with this order is *Tiberius E IV* (2). See the addition to *D. N. R.* published below (3). Not *De Temp.* complete; the chronicle (Chs. 16-22) is omitted and two new chs. are added, the second one based on *De Temp. Rat.*, Ch. 4 (5). Not a continuation, even in this MS., of DIONYSIUS, but short works of ABBO OF FLEURY; cf. A. VAN DE VYVER in *Revue Bénédictine* XLVII (1935), 140 ff. He did not cite this MS. or *Tib. E IV*. (6) See W. H. STEVENSON in *English Historical Review* XXII (1907), 72 ff. The name of MARIANUS SCOTTUS at least goes back to *Tib. E IV*; although the rubric there is now illegible, it is found in the old Cotton catalogue (SMITH). (9a) This is ISIDORE, *Etym.* 6, 17, incomplete; the cycle has been corrected, but otherwise the material is taken directly. (9c) Col. 1 is BEDE; col. 2 is OROSIUS; col. 3 is the pseudo-Incarnation era (A. M. 5501 = A. D. 1), first used by ANIANUS (cf. IDELER II, 458; RÜHL, p. 191) and in the west by HIPPOLYTUS and the author of the Cologne Prologue (cf. KRUSCH, *Studien*, p. 232). In a world lasting twelve hours of 500 years each, Christ came in the last hour, or after 5500 years had passed (cf. BEDE'S Letter to PLEGUIN, ed. GILES I, 152). Col. 4 is not used by BEDE or OROSIUS, but is the pseudo-Victorian mundane era (A. M. 5200 = A. D. 1); cf. MCCARTHY, *Annals of Ulster IV*, p. xcii. Col. 5 (A. D. 1064 = A. D. 1363) is based on ROBERT OF HEREFORD'S assumption that A. M. 5268 = A. D. 1064. Cf. STEVENSON, *op. cit.*, p. 75, note 1.

Assuming his calculation is accurate, the Incarnation must have occurred 253 years earlier according to the Vulgate calculation (from BEDE), where A. D. 1 = A. M. 3953. These columns, I believe, are based on MARIANUS SCOTTUS through ROBERT OF HEREFORD and represent mathematical attempts to find a true historical Christian era.

16. London, B. M., *Harley 3091* (*saec.* x), fols. 6^{r}-12^{r}. "Incipiunt versus bedae prbi." Quatrain. "Incipit lib. bedae prbi. de natura rerum." *Capitula.*

17. London, B. M., *Harley 3735* (*saec.* xiv), fols. 3^{v}-5^{r}. Not *De Temp. Rat.*, as in Harley catalogue and MOMMSEN, *Chronica Minora* III, 240. The hand is cramped and at times illegible.

18. London, B. M., *Regius* 13 *A XI* (*saec.* xi/xii), fols. 14^{v}-22^{r}. "Incipiunt duo libelli bede presbiteri de natura rerum et ratione temporum. Incipit liber primus de quadrifario dei opere." Source-marks in margin through Ch. 10. *De Temporibus* is *liber ii*, but the *incipit* is taken from the preface to *De Temp. Rat.*

19. Milan, Ambrosiana, *D 48 Inf.* (A. D. 1018), fols. 57^{r}-66^{r}. "Incipiunt capitula libri primi de natura rerum." *Capitula* and glosses, but no quatrain. Sources in chapter-titles. Perhaps a copy of 63.

20. Munich, *210* (A. D. 818, Salzburg), fols. 129^{v}-145^{r}. Quatrain, but no *incipit.*

21. Munich, *21557* (*saec.* xi, from Weihenstephan), fols. 84^{r}-93^{v}. "Incipit Liber Bedae Prbi. De Naturis Rerum." *Capitula*, followed by quatrain.

22. Orleans, *31* (*saec.* ix/x), pp. 221-9. "Incipiunt versus bedae prbi." Quatrain. "Incipiunt cap. 1. b. prbi. de nat. rerum."

23. Oxford, Bodleian, *Auct. F. 3. 14* (*saec.* xii, Malmesbury?), fols. 20^{r}-27^{v}. Quatrain and *capitula.* "Explicit liber bedae venerabilis presbiteri de natura rerum." Source-marks in margin.

24. Oxford, Bodleian, *e Mus. 223* (*saec.* xiii?), fols. 153^{r}-161^{r}. "Bedae excerpta ex plinio de imagine mundi et temporum." Through Ch. 49. Very corrupt. Although I have not seen it, *HM 1345* in the Huntington Library is undoubtedly related; cf. DERICCI and WILSON, *Census*, p. 107.

25. Oxford, Magdalen College, *183* (*saec.* xv), fols. 1-11. Quatrain and *capitula.*

26. Oxford, St. Johns College, *17* (A. D. 1083? Winton?), fols. 62^{r}-65^{r}. Begins in Ch. 16. Interlinear and marginal glosses. "Expl. de natura rerum lib." A few diagrams and tables in text. Closely related to items 14 and 15.

27. Paris, B. N., *Latin 4860* (*saec.* x, once at St. Stephen in Mainz), fols. 108^{r}-111^{v}. "Incipit Liber Bedae prbri. de naturis rerum versus eiusdem." Quatrain and *capitula.*

28. Paris, B. N., *Latin 5239* (*saec.* x, St. Martial, Limoges), fols. 24^{r}-32^{r}. "Incipiunt versus bedae praesbiteri." Quatrain. "Incipit liber bedae prbi. de natura rerum." *Capitula.* Very close to item *29*.

29. Paris, B. N., *Latin 5543* (*saec.* ix^{ex}, Fleury), fols. 76^{v}-85^{r}. "Incipiunt Versus Bedae prbi." Quatrain. "Incipit Liber Bedae prbi. de natura rerum." *Capitula*, and glosses through Ch. 13.

30. Paris, B. N., *Latin 7361* (*saec.* xi), fol. 42^{v}. "Versus Bedae Presbiteri." The quatrain, followed by the chronicle from *De Temporibus* continued to A. M. 4761. No *D. N. R.* text.

31. Paris, B. N., *Latin 7400B* (*saec.* ix^{ex}), fols. 13^{r}-27^{r}. A late hand has written on fol. 12^{r} : "Incipit Liber Bedae de Naa. Rerum," followed by *capitula*. The MS. hand starts fol. 13^{r} with quatrain, but no *incipit*.

32. Paris, B. N., *Latin 7418* (*saec.* xiv), fols. 123^{r}-137^{v}. In 98 chapters ! I do not know the source of the extra material added at the end.

33. Paris, B. N., *Latin 11130* (*saec.* xi/xii), fols. 69^{r}-81^{r}. Quatrain, *capitula*, and many *figurae*.

34. Paris, B. N., *Latin 13013* (*saec.* ix, St. Germain des Prés), fols. 30^{r}-40^{v}. *D. N. R.* and *De Temp.* (Chs. 1-16) combined without title, quatrain, *capitula*, or chapter-titles. *D. N. R.* ends fol. 37^{r}.

35. Paris, B. N., *Latin 14088* (*saec.* x), fols. 50^{r}-59^{r}. With quatrain and *capitula*, in what looks to be a volume of school notes.

36. Paris, B. N., *Latin 15685* (*saec.* ix), fols. 1^{r}-10^{r}. "Incipiunt versus bedae prbi." Quatrain. "Incipit liber bedae prbi. de natura rerum." With *capitula*. Related to item *34* and probably to *28* and *29*.

37. Paris, B. N., *Latin 16361* (*saec.* xii), pp. 1-18. "Versus Bedae." Quatrain and *capitula*. No *explicit*.

38. Paris, B. N., *N. A. 1612, Libri 87* (*saec.* ix, once at Tours), fols. 1^{r}-7^{r}. Quatrain and *capitula*.

39. Paris, B. N., *N. A. 1615, Libri 90* (*saec.* ix, Auxerre ? once at Fleury), fols. 128^{r}-135^{r}. "Versus Bedae Presbiteri." Quatrain, *capitula*, glosses using Tironian notes.

40. Paris, B. N., *N. A. 1632, Libri* 41 (*saec.* ix, Fleury ?), fols. 1^{r}-9^{r}. "Versus Bede prbi." Quatrain, *capitula*, extensive glosses. Pages badly darkened.

41. Rouen, *26* (*saec.* ix), fols. 164^{r}-173^{r}. "Versus bedae presbyteri." Quatrain. "Capit. libri de naturis rerum." No *explicit*.

42. St. Gall, *248* (*saec.* ix), pp. 83-92. No *incipit*; quatrain; some sources in chapter-titles. "Finit liber primus [*D. N. R.*] incipit secundus [*De Temp.*]." The same hand has added *capitula* on p. 227. Related to items 13 and 65.

43. St. Gall, *250* (*saec.* ix^{ex}), pp. 121-145. "Versus Bedae prbi." Quatrain. "Explicit liber de natura rerum."

44. St. Gall, *251* (before 820), pp. 33-44. "Versus Betae presbiteri." Quatrain. "Inc. de naturis rerum." Some source-marks in margin.

45. St. Gall, *397* (*saec.* ix), pp. 123-140. Quatrain. "Explicit liber de naturis rerum." A computistical copy-book in many hands.

46. Schaffhausen, *61* (*saec.* x), fols. 1^{v}-9^{r}. "Versus Bedae Presbyteri." Quatrain and *capitula*. "Explicit liber de nat. rerum."

47. Stuttgart, *Theol. Q. 172* (*saec.* xii, from Chomberg), fols. 1^{r}-7^{v}. "Incipit liber bede prbi. de natura rerum." Quatrain.

48. Valenciennes, *174* (*saec.* ix, St. Amand), fols. 1^{v}-13^{v}. "Incipiunt versus bedae prbi." Quatrain and *capitula*. "Incipit liber de natura rerum." Glosses. Ink faded and illegible in places through fol. 9^{r}.

49. Valenciennes, *343* (*saec.* ix, St. Amand), fols. 14^{r}-22v. "Incipiunt capitula libri bedae de natura rerum ex opusculis sci. augustini." *Capitula*. "Versus Bedae presbiteri." Quatrain. Glosses. "Explicit liber bedae de naturis rerum."

50. Vatican, *Barb. Lat. 477* (*saec.*xi), fols 72^{v}-88^{r}. *Capitula* and quatrain.

51. Vatican, *Ottob. Lat. 6* (*saec.* xii), fols. 15^{r}-18^{v}. Starts after a lost gathering : "- sub lumen humili -" (Ch. 27). "Finit lib. Baede de natura rerum."

52. Vatican, *Pal. Lat. 317* (*saec.* xiv), fols 111^{r}-114^{v}. "Beda de naturis rerum." *Capitula* and quatrain.

53. Vatican, *Pal. Lat. 1449* (*saec.* ix, Mainz), fols. 105^{r}-112^{v}. Quatrain and *capitula*. "Explicit liber de natura rerum."

54. Vatican, *Regin. Lat. 123* (A. D. 1056, Ripoll.). This *computus*, in 223 folios, is divided into four books, each containing excerpts from writers on natural science, especially ISIDORE and BEDE. All *D. N. R.* is given somewhere in it, primarily in Book III.

55. Vatican, *Regin. Lat. 309* (*saec.* x, St. Denis, Paris), fols. 107^{v}-117^{r}. "Versus Baedae Praesbiteri." Quatrain. "Capitula libri De naturis rerum."

56. Vatican, *Regin. Lat. 755* (*saec.* x, Auxerre?), fols. 88^{r}-92^{v}. Quatrain and *capitula*.

57. Vatican, *Regin. Lat. 1038* (*saec.* x), fols. 129^{r}-135^{v}. Quatrain and *capitula*.

58. Vatican, *Regin. Lat. 1260* (*saec.* ix, Fleury), fols. 1^{r}-7^{v}. "Incipit liber Baedae Prbti. De natura rerum." Quatrain. Heavy glosses through Ch. 22 (fol. 4^{r}). Ch. titles stop fol. 4^{v}, and initials fol. 5^{v}.

59. Vatican, *Regin. Lat. 1405* (*saec.* xi), fols. 56^{r}-84^{r}. "Versus Bedae presbiteri." *Capitula* and quatrain. "Explicit liber Bedae Presbiteri de naturis rerum."

60. Vatican, *Rossi. Lat. 247* (*saec.* xi/xii), fols. 8^{r}-19^{v}. *Capitula*, quatrain, glosses. "Explicit primus liber de natura rerum."

61. Vatican, *Vat. Lat. 642* (*saec.* xi, once at Lyons), fols. 1r-6v. "Incipit liber bede prbi. de natura rerum." *Capitula* and quatrain.

62. Vatican, *Vat. Lat. 643* (*saec.* xii, Melk ?), fols. 1r-9r. *Capitula* and quatrain.

63. Vatican, *Vat. Lat. 644* (*saec.* x, St. Gall ?), fols. 1v-6v. Begins Ch. 10 : "- tres autem medii -"; ends Ch. 47. The heaviest marginal glosses of any *D. N. R.* manuscript; they are several times the length of the text.

64. Vatican, *Vat. Lat. 645* (*saec.* ix), fols. 81v-92v. Quatrain and *capitula*. End of last chapter missing.

65. Zurich, Zentralbibl., C. *62* (*saec.* x, formerly at St. Gall), fols. 224v-232v. Quatrain.

66. Zurich, Zentralbibl., *Car* C. *176* (*saec.* x/xi), fols. 188r-202v No quatrain. *Figurae*.

This list speaks for itself of the popularity and influence of BEDE's work in the renaissance of the ninth century. For instance, despite the ravages of fire and man, four manuscripts from the period are still extant at St. Gall, where they were written. Undoubtedly the work stimulated the study of PLINY, on whose work much of the natural science of the Middle Ages was based. As with *De Temporibus* and *De Temporum Ratione*, there are apparently no extant manuscripts of *D. N. R.* of English provenance before *saec.* xi. In the main, *saec.* ix manuscripts come from two centres — northern France (Fleury, Auxerre, Limoges), and Switzerland (St. Gall, Reichenau). The early ninth century French and Swiss manuscripts are quite distinct in their peculiarities. Other scriptoria seem to have looked to one centre or the other for their exemplars. The Cologne and Mainz manuscripts, for instance, are related to the French group. Yet a comparison of English manuscripts written after the Conquest seems to give us a third group, derived from earlier English archetypes that have disappeared. Elements found in part or all of the manuscripts of each of these three groups would appear without further question to have come from BEDE's hand.

The authenticity of the quatrain preceding *D. N. R.* in the published texts has been questioned, and of late students of BEDE's metrical works have tacitly avoided it; but the evidence of the manuscripts supports its authenticity beyond question.

According to his own testimony, BEDE used marginal source-marks in some of his theological commentaries, and Father SUT-

CLIFFE and Professor LAISTNER have shown (4) that the marks are preserved in a few manuscripts. No such source-marks were used in BEDE's other works. Yet a number of manuscripts of *D. N. R.*, as indicated in the list above, give the primary source of the chapter in the chapter-title or in the margin. The most complete list is found in *Egerton 3088* (item *15*), where the following four names appear in the titles of the chapters indicated : AUGUSTINUS I; AMBROSIUS VII, VIII; YSIDORUS IV, V, XI (5), XXVII; PLINIUS III, VI, IX, X, XI (5), XII, XIII, XV, XVI, XIX, XX, XXII, XXXVII. The sources marked are not the only sources for the chapters in question, but they are primary; for instance, Chs. 2 and 9 quote from both ISIDORE and PLINY. Other English manuscripts give these source-marks. Item *26*, which is closely related to *14* and *15*, is incomplete, but has some of the source-marks. Item *14* was, of course, the exemplar of *15* and contained the source-marks, but the rubrics are now virtually entirely illegible. *18* and *23*, from different parts of England, have source-marks in the margin.

But the group of English manuscripts is not alone in the marks. An almost complete set appears in the chapter-titles of *13* (Karlsruhe, *Reichenau 167*), which has proved to be the most valuable single witness to the text of the computistical works; we may reasonably infer that its text of *D. N. R.* is equally sound. At all events it is not related to equally early French or Swiss manuscripts. After it was written, its influence was felt in several manuscripts of southern Germany and Italy, but not a single manuscript suggests what may have come before it. Item *42* is in part copied from it. The oldest example of the St. Gall group is *44*, written before the year 820; it has the source-marks in the margin. From it may have come the source-marks in *63*, *42*, and *19*.

No early manuscript of the French group preserves the source-

(4) M. L. W. LAISTNER, 'Source-Marks in BEDE Manuscripts,' *Journal of Theological Studies* XXXIV (1933), 350-354 ; E. J. SUTCLIFFE in *Biblica* VII (1926), 428-439.

(5) Ch. XI, as in many manuscripts, is divided in two at 'Sidera autem —.' The second part is entitled, 'De vario effectu siderum Plinius.' It seems possible that this was BEDE's division, or that he issued two recensions, for there seem to be two recensions of *De Temporibus*, with which *D. N. R.* travelled. There were two recensions of the *Ecclesiastical History ;* cf. PLUMMER I, p. xcvii.

marks, but there are indications that they once were present. Item *48* has : ' de natura rerum ex opusculis sci. augustini.' *Augustinus*, the source-mark for the first chapter, was carried over into the *incipit*; for there is not a single direct quotation from Augustine in the whole work and his name appears nowhere except in the source-marks. Item *8*, of considerably later date but belonging to the French group, contains a nearly complete set of source-marks. A manuscript once in the Goerres collection at Coblenz, which I have not seen, was written at Trier, possibly as early as 810. According to its description in a sale catalogue (6) : ' Fol. 142*b*. De natura rerum. Cap. I. de quadrifari odei opere et opusculis augustini episcopi.' Item *3*, written at Metz, has the same heading.

Another scribal supposition is apparent in item *24* : 'Bedae excerpta ex plinio.' This statement might have been taken from BEDE's remark at the conclusion of Ch. 14; but the majority of source-marks are 'Plinius,' and the same attribution is found in the *incipit* in *Egerton 3088*, where that scribe unquestionably had source-marks to work with. Since we have in the manuscripts of *D. N. R.* at least as clear a tradition of source-marks as in BEDE's theological commentaries, there can be little doubt that they are BEDE's creation. There is more evidence that they were included in the chapter-titles than that they were originally written in the margin. We may reasonably infer, therefore, that the work was prepared simply as a volume of excerpts on a common subject. The precocity of the prefatory quatrain, which has no analogue in BEDE's later work, and the free mention of Pliny, whom BEDE in later life was careful to justify, for BEDE seems to have grown more conservative as he grew older, suggest that *D. N. R.* was composed early in life. Without tangible evidence I would consider it at least as early as *De Temporibus* and probably earlier (7).

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(6) Dr. K. HAUCK. *Catalogus lib. mss. e Bibl. Goerresiana* (Munich, 1902), pp. 10-11. Cf. EMIL JACOBS, 'Die Handschriftensammlung JOSEPH GOERRES,' *Zentralblatt für Bibliothekswesen* XXIII (1906). 189-204; and *Archiv* VIII (1843), 616, and XI (1858). 290.

(7) *De Temporibus* was written in the year 703, when BEDE was about thirty years old. At first glance it seems elementary and little more than an adaptation of ISIDORE, but further examination shows that BEDE's computistical doctrines had already achieved their complete form. *De Temporum Ratione*, written twenty-two years later, offers only refinements of detail.

The scribe of *Egerton 3088* included a long gloss found in the margin of his exemplar, *Tiberius E IV*, in the body of *D. N. R.*, Ch. 43 (fol. 75*r*). *Tiberius E IV* was probably written in the year 1205; I doubt whether the gloss is much earlier, for no trace of these glosses appears in earlier manuscripts. The author is customarily reticent about details, but the passage contains so much of interest that I give a complete transcript here. A boy abducted from the shores of England to serve for twelve years in Egypt returns to regale his family with first-hand observations. I judge *mihi frater* is a blood brother. The traveller seems to have written or dictated a book, from which the quotations were taken. Whether the 'abduction' was a part of a program of the Crusades or a commercial enterprise, his information comes as fresh food to an English student picking at the dry bones of PLINY, *via* BEDE, even though that student immediately turns his new knowledge into a theological *exemplum*.

Dicunt quidam consueram Nili fluminis exundationem, qua plana Egipti singulos solet irrigare per annos, inde fieri quod ostium eis quod in mare magnum influit, occurrentibus ethesiarum flatibus et impetu pelagi ferventis, objecti arenarum cumuli certis anni temporibus obcludant. Talique objectu quasi aggeris fortissimi prepedita fluminis aqua per Egipti campestia longe lateque diffunditur. Donec emenso tempore non pauco denuo violentia fluminum aggerem rescindat arenarum et more solito liberum mare intrandi cursum reperat. Ethesias autem vocant ventos qui a solsticiali intonant occasu. Horum sententiam et ipse quondam non plene eruditus in libro quem de natura rerum composui [composium-MS] secutus sum; sed ut coperi quae hec fuit Pompei Trogi et eius similium sententia, qui creaturam omnem non divina providentia sed fortuitis potius casibus agi credunt. Improbandam eam omnimodis esse didici, maxime cum fidelissimus mihi frater ac veracissimus, qui de Britannia puer abductus xii annos continuos apud Egiptios sive Sarracenos, manifeste que sit eiusdem rei veritas intimaverit. Et ego, inquit, cum in illis peregrinarer locis, eandem qua vos dicitis famam de precluso arenis ostio fluminis sive crescente aqua seu generalem cursum agente ipse procedens nichil tale videbam. Sed toto anni tempore eadem semper libertate in mare flumen exire. Unde intelligendum quod non fortuitu ventorum sive undarum opere sed dispositione eius qui fecit ventis pondus et aquas. Appendit mensura huiusmodi : Irrigatio terre eius, que propter ardorem solis imbres sustinere non valet, divinitus sit concessa. Qui videlicet frater multa et alia de natura sive dispositione regionum

illarum nobis incognita referre solebat; verum, quia nobis de Nilo sermo est, aliqua eorum que de illo nobis flumine narravit hic commemoranda duximus. Cum, inquit, fluminis unda impleto suo cursu paulatim sese per dies ad alveum suum subducere ceperit, sequentes e vestigio accole mox in humida adhuc humo olerum diversa genera et maxime trifolium album quod [quo-MS] per feno utuntur seminant. Ubi autem frumentum vel ordea serere voluerint, paulo diutius donec perfectius tellus exsiccetur expectant; et sic levi arato terram proscindentes [pre-MS], sua illic semina commendant. Cum trifolium oriri ceperit ac florere, tanta campos latissimos gratia candoris vestit ac si uno lintheamine omnia sint cooperta. Hoc in loco hec dicta sufficiant.

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A Geographical Treatise by Georgius Gemistus Pletho

The most important intellectual figure of the last decades of the Byzantine Empire was GEORGIUS GEMISTUS PLETHO, who for over forty years (ca. 1412-1452) held forth at Mistra in the Peloponnesus instructing youth, giving counsel to governors and receiving guests from abroad. His only excursion seems to have been to the Union Council at Florence in 1439, where he made a great impression on the leaders of the Italian Renaissance. He had become a devotee of PLATO and was the founder of the movement away from ARISTOTLE in Italy as well as in Greece. The controversy in which he thus became involved and his writings on it are the main grounds for his fame (1).

Among the works ascribed to PLETHO are a number with no bearing on this controversy, which ALEXANDRE (p. vii f.) barely mentions, assigning them to an early period in the author's life. They are not very important, consisting chiefly of excerpts from classical authors (STRABO, DIODORUS, PLUTARCH, APPIAN, THEOPHRASTUS, ARISTOTLE, DIONYSIUS HALIC.); but they may be of bibliographical interest as illustrating the range of PLETHO's reading and the history of the texts excerpted. These works are found in many 15th and 16th cent. MSS., all of which probably derive from two codices in Venice that belonged to PLETHO's

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(1) The standard work on PLETHO is C. ALEXANDRE, *Pléthon. Traité des lois* (Paris 1858), with an ample *Notice préliminaire* on the life and works of the author. There is an extensive collection of material in MIGNE, *Patrologia graeca*, Vol. CLX. See also FRANZ TAESCHNER, "Georgios Gemistos Plethon, ein Vermittler zwischen Morgenland und Abenland zu Beginn der Renaissance", *Byz.-neugr. Jahrbuch* VIII (1929-1930), 100-113. PLETHO lived to be nearly a hundred years old (ALEXANDRE, pp. xx, xl), and it is remarkable that all his known activities fall within the last forty years of this span and are in fact heavier toward the end of it.

onetime pupil Card. BESSARION and are alleged to be in PLETHO's own hand (2).

The excerpts from the geographer STRABO are in five chapters. The first is entitled *περὶ τοῦ τῆς γῆς τῆς οἰκουμένης σχήματος*, *On the shape of the inhabited part of the world*, and is drawn from Str. II 118-131. The second chapter is an independent treatise dealing with certain misstatements on the part of STRABO in the first chapter. Since geography was notoriously neglected in the Byzantine Empire and geographical material is scarce in Byzantine literature (3), this treatise of PLETHO, meagre though it is, may not be without interest as a specimen of an educated Greek's knowledge of the subject.

Διόρθωσις ἐνίων τῶν οὐκ ὀρθῶς ὑπὸ Στράβωνος λεγομένων. (4)

1. Οὔτε τὴν θάλατταν τὴν Κασπίαν ὀρθῶς οἴεται Στράβων (pp. 119, 121) *τῷ ὠκεανῷ συνβάλλειν. καθ' ἑαυτὴν γὰρ οὖσα αὕτη πάντοθεν καταλαμβάνεται, τὸ μὲν σχῆμα θυρεῷ ἔχουσά πως παραπλήσιον, τὸ δὲ μέγεθος οὐ πολύ τι τοῦ Εὐξείνου Πόντου μείζων · ἣν καὶ εἰκάζει Ἀριστοτέλης* (*Meteor.* I 13, p. 351*a*), *πολλῶν ἐς αὐτὴν καὶ μεγάλων ἐκβαλλόντων ποταμῶν οὐχ ὑπερπληρουμένην, τῷ Πόντῳ δι' ὑπονόμου συμβάλλειν, ὑπὸ γῆν πρὸς αὐτὸν συντετρημένην.*

2. Οὔτ' οὖν τοῦτο ὀρθῶς οἴεται Στράβων, οὔτε τὸ διακεκαυμένην τινὰ εἶναι ζώνην ὅλην δι' ὅλης ἀοίκητον (118 f., cf. 95, 111). *οἰκουμένη γὰρ ἅπασα ἡ ἀμφίσκιος καταλαμβάνεται, ἔξω τῶν διὰ πάσης αὐτῆς*

(2) Cod. Marc. graec. 379 fol. 1-108 contain excerpts from STRABO, and Cod. 406 entire, excerpts from several authors. See JAC. MORELLI, *Bibliotheca manuscripta graeca et latina* I (Bassiani 1802), pp. 244 f., 269-274; and KRAMER, *Strabonis geographica* I (1844), pp. xlvii-li. The two MSS. are of the same material, size and handwriting. There is nothing by the primary hand in either MS. to indicate their authorship, but there is ample notice of it by secondary hands. At the beginning of each excerpt in 406 a later hand has inscribed PLETHO's name, and on the last leaf (140*r*) has added *αὐτόχειρ καὶ τὸ πᾶν γέγραφεν ὁ μέγιστος κατὰ σοφίαν*. BESSARION also ascribes the contents of both MSS. to PLETHO in his indices on the fly-leaves. The handwriting itself, while not calligraphic, is neat and regular, and scarcely seems that of a man past eighty, and a scholar at that!

(3) KRUMBACHER, *Geschichte der byz. Litt.* ² (1897), pp. 409 ff.

(4) Cod. Marc. graec. 379 fol. 12*r*-15*v*. The text is almost faultless, and I have not altrered it. The treatise was published by JO. ADAM GOEZ, *Anecdota graeca* (Nuremberg 1798), pp. 90-96, but from a very poor MS. (Vatic. graec. 173). Cf. MORELLI, *op. cit.*, p. 246.

ἄλλων ἀλλαχοῦ δι' ἀνυδρίαν ἐρήμων χωρίων. τῆς γὰρ ζώνης ταύτης καὶ ἔτι τῆς ἑτεροσκίου ὅση ταύτῃ πρόσχωρος, τὰ μὲν πεδία ἥκιστα ὕεται, τὰ δ' ὄρη καὶ πάνυ δὴ ὕεται · ὥστε καὶ οἰκεῖται τὰ ὄρη, τὰ δὲ πεδία διά γε ἀνυδρίαν οὐκ οἰκεῖται, ἐὰν μὴ ποταμοῖς διαρρέηται, ᾗ δὴ καὶ ἡ Αἴγυπτος . ἡ δ' ἀμφίσκιος ἅπασα οὕτω δὴ ᾗ καὶ φαμὲν οἰκεῖται · ὥστε τῆς ὑπὲρ (*sic*) Αἴγυπτον Αἰθιοπίας ἐπὶ τὸ Σεληναῖον καλούμενον διατεινούσης ὄρος, ἀφ' οὗ ὁ Νεῖλος πληροῦται — τοῦ δὲ ὄρους τούτου τοῦ ἰσημερινοῦ πολὺ νοτιωτέρου ὄντος · οὐ γὰρ ἄν που ὁ Νεῖλος θέρους γε ὄντος παρ' ἡμῖν ὑπερεπληροῦτο, εἰ μὴ χειμὼν τότε δὴ ἦν τοῖς ἐκεῖ — ἔτι καὶ τούτου τοῦ ὄρους νοτιωτέρα ἑτέρα Αἰθιοπία ἱστορεῖται, ἡ Ἀγίσυμβα καλουμένη Αἰθιόπων χώρα, πρὸς αὐτῷ δὴ τῷ ἑτέρῳ τῆς ζώνης ταύτης διακειμένη πέρατι. ἀλλὰ καὶ τῆς Ταπροβάνης νήσου μέρος δή τι τοῦ ἰσημερινοῦ νοτιώτερον ἱστορεῖται· ὥστε μηδὲν τῆς ζώνης ταύτης μέρος ὅλον δι' ὅλου εἶναι ἀοίκητον.

3. Ἀλλ' οὐδ' ἐκεῖνο ὀρθὸν οὐδὲ τεχνικὸν τοῦ Στράβωνος (118 f., cf. 112, 116 f.), τὸ παραλλήλους τοὺς μεσημβρινοὺς ποιεῖν ἀλλήλοις · οἳ πρῶτον μὲν συμπίπτουσιν ἐπ' ἀμφότερα, ἔπειτα τῶν αὐτοὺς παραλλήλων ἐπιζευγνυσῶν γραμμῶν πολὺ μείους ἀεὶ τὰς πρὸς τοῖς πόλοις τῶν πρὸς τῷ ἰσημερινῷ ἀπολαμβάνουσιν · ὥστε καὶ τὸ χλαμυδοειδὲς σχῆμα, ᾧ αὐτὸς τὴν καθ' ἡμᾶς οἰκουμένην εἰκάζειν βούλεται, ταύτῃ πολὺ μᾶλλον συμβαίνειν ἢ ᾗ αὐτὸς πειρᾶται δεικνύναι, τοῦ πρὸς τῇ κατεψυγμένῃ παραλλήλου τοῦ πρὸς τῷ ἰσημερινῷ πολὺ μείονος ὄντος, ὥστε τὸ περιεχόμενον ὑπό τε τῶν παραλλήλων τούτων σχῆμα καὶ τοῦ τε ἐωθινοτάτου καὶ δυσμικωτάτου τῶν μεσημβρινῶν χλαμυδοειδές τι ἀποβαίνειν.

4. Ταῦτα μὲν οὖν μείζω ἁμαρτήματα αὐτοῦ ἐστιν · ἕτερα δὲ μείω τούτων, πρῶτον μὲν τὸ τὴν Λιβύην μὴ τῷ Ἀραβίῳ κόλπῳ καθ' ἑτέρους ἀπὸ τῆς Ἀσίας διαιρεῖν, ἀλλὰ τῷ Νείλῳ (Str. 126, cf. 32, 35), πολὺ ἀμείνονος ὅρου ὄντος ἁπανταχοῦ, ὅπου καὶ ἔνεστι, θαλάττης ἢ ποταμοῦ.

5. Ἔπειτα καὶ τὸ τῷ διὰ τῆς Ἰέρνης παραλλήλῳ πρὸς τὴν κατεψυγμένην ὅρῳ χρῆσθαι (Str. 118), οὔσης ἔτι καὶ αὐτῆς βορειοτέρας τῆς Θούλης, καὶ οἰκουμένης καὶ ταύτης. ἐπέδειξε δ' ἡμῖν Παῦλος ὁ Φλωρεντῖνος, ἀνὴρ πολλοῦ ἄξιος, πίνακα ὃν ἔφασκε παρά του τῶν ἀπὸ τῆς Δατείας παρειληφέναι, ἀνδρὸς τῶν τοιούτων οὐκ ἀπείρου, ἐν ᾧ αὐτή τε Ἰέρνη κατετέτακτο καὶ ἡ ἑτέρα τῶν Βρετανικῶν νῆσος ἡ μείζων καὶ Θούλη καὶ χερρόνησος ἡ Κιμβρικὴ καὶ ἡ Γερμανική τε καὶ Οὐενεδικὴ πᾶσα παραλία, τῆς δὲ Κιμβρικῆς ταύτης χερρονήσου πρὸς ἕω ἐν τῷ Οὐενεδικῷ ἤδη κόλπῳ αὐτὴ ἡ Δάτεια νῆσος οὖσα,

μέγεθος τῶν Βρετανικῶν τῇ μείζονι ἐφάμιλλος, πορθμῷ στενῷ τε καὶ μακρῷ τῆς ἀντιπέραν καὶ πρὸς ἄρκτους διεργομένη ἠπείρου. ταύτης τῆς νήσου τὰ μὲν βόρεια καὶ πρὸς τῷ πορθμῷ ἀοίκητα ἀπέφαινεν ὥσπερ καὶ τὴν καταντικρὺ ἤπειρον, τὰ δὲ λοιπὰ οἰκούμενα · τὴν δὲ βορειοτέραν ταύτης ἤπειρον οὖσαν ἀοίκητον, κολπουμένην τε πρὸς ἑσπέραν τοῦ πορθμοῦ τούτου ἐπὶ πολὺ τῆς περισκίου καὶ ἔπειτα κάμπτουσαν πρός τε νότον ἅμα καὶ ἑσπέραν, ἄκραν προβάλλειν ἐν μεσημβρινῷ μὲν τῷ διὰ τῆς Ἰέρνης, παραλλήλῳ δὲ τῷ διὰ Θούλης.

6. Ἐπυθόμεθα δὲ καὶ παρὰ πλειόνων τῶν τὴν νῦν μὲν Ῥωσίαν πάλαι δὲ Σαρματίαν καλουμένην ἱστορηκότων, ὡς καὶ πρὸς βορᾶν τῆς χώρας ταύτης ἕτερος κόλπος εἴη ἀπὸ τοῦ Ὑπερβορείου ὠκεανοῦ κατὰ τὸ εἰκὸς διὰ τῆς κατεψυγμένης εἰσέχων, διέχων τε τοῦ Οὐενεδικοῦ κόλπου, ᾗ βραχύτατον ἀλλήλων οἱ κόλποι διεστᾶσιν, ὁδὸν ἡμερῶν ἕξ, καλεῖσθαι δ' ὑπὸ τῶν ἐπιχωρίων τὸν κόλπον τοῦτον Ψυχρὰν θάλατταν · ἐν ᾧ καὶ τοὺς ἰχθῦς γίνεσθαι τοὺς ἀμφιβίους τοὺς τὰ μεγάλα καὶ λευκὰ ἔχοντας κέρα (*sic*), ἃ καταπηγνύντες ἐς τὴν γῆν, ἐπειδὰν ἐς τὴν χέρσον ἐξίωσι, καὶ ἔπειτα πρὸς αὐτὰ ἑλκόμενοι πορεύονται. ἐς τοῦτον τὸν κόλπον καὶ ποταμὸν μέγαν ἐκβάλλειν Τιβηνόν, οὗ τῇ ἀπὸ τῶν πηγῶν ἐπὶ πηγὰς τὰς Τανάϊδος γραμμῇ καὶ ἡ Εὐρώπη πρὸς τὴν Ἀσίαν ἂν εἴη ὁριστέα, ὡς τοῖς τε ποταμοῖς καὶ τῇ θαλάττῃ τὸ λοιπὸν πᾶν ὁριζόμενον. περιοικεῖν δὲ τὸν κόλπον τοῦτον, ἐφ' ὅσον γε οἰκήσιμον, ἔθνος ἄβιον Περμίους καλουμένους ἀπὸ θήρας μόνης ζῶντας. καὶ ἄλλα δ' αὐτόθι τούτων ἐωθινότερά τε καὶ ὀλίγῳ νοτιώτερα ἐπυθόμεθα ὄντα ἔθνη ἄβια, τοὺς μὲν Μορδίβας καλουμένους τοὺς δὲ Μεστόρας, οὓς καὶ ἰχθυοφαγεῖν τὰ πολλὰ ἐκ λιμνῶν ἃς περιοικοῦσιν, ἀφ' ὧν ὁ Ῥᾶς ποταμὸς ὁ ἐς τὴν Κασπίαν ἐκβάλλων ῥεῖ κατὰ τὰς πρὸς ἕω αὐτοῦ ἀρχάς . τούτων οὖν πάντων τοὺς ἐσχάτους πρὸς τῇ κατεψυγμένῃ οἰκοῦντας οὐ τῆς Ἰέρνης μόνον ἀλλ' ἔτι καὶ τῆς Θούλης βορειοτέρους εἶναι.

7. Οὐ μὲν δὴ οὐδὲ περὶ τῶν πρὸς ἕω αὐτῷ ὀρθῶς λέγεται, τὸ Ἰνδοὺς καὶ Σκύθας εἶναι ἐσχάτους τῶν ταύτῃ καὶ ἐπ' ὠκεανόν τινα τούτους ἑῷον καθήκειν (Str. 118, 129 f.). οὔτε γὰρ ἐσχάτους εἶναι τούτους πρὸς ἕω, ἀλλ' ἔτι καὶ τούτων ἑωθινοτέρους Σίνας τε εἶναι καὶ Σῆρας, μεγάλα τε ἄμφω γένη καὶ χώραν κατέχοντα οὐκ ὀλίγην · οὔτ' ὠκεανόν τινα ἑῷον μέχρι νῦν ἱστορῆσθαι πρὸς οὐδένων. τὴν γὰρ πρὸς Ἰνδοῖς θάλατταν νοτόθεν τε αὐτοῖς εἶναι καὶ οὐδαμοῦ πρὸς ἕω ἐπιστρέφειν, ἐφ' ὅσον γε καὶ ἱστόρηται περὶ αὐτῆς, ἀλλὰ καὶ πρὸς δυσμὰς μᾶλλον. τὰ γὰρ Καττίγαρα ὁ τῶν Σινῶν ὅρμος, ὃ τῆς ἐγνωσμένης τοῦ πελάγους

τούτου ἑῴας ἠϊόνος πέρας ἐστί, συχνῷ τοῦ ἰσημερινοῦ ὄντα νοτιώτερα, καὶ τῆς Θεινῶν, τῆς γε Σινῶν μητροπόλεως, παραλίας, συχνῷ αὖ βορειοτέρας τοῦ ἰσημερινοῦ οὔσης, δυσμικώτερά ἐστιν. εἶναι μὲν οὖν καὶ πρὸς ἕω ὠκεανὸν ἀνάγκη — τοῦ γὰρ πρὸς δυσμὰς ἡμῖν ὠκεανοῦ θάτερον πέρας ἀνάγκη πρὸς ἕω τοῖς τε Σίναις εἶναι καὶ Σηρσίν — ἀλλ' οὐχ ἱστόρηταί γε μέχρι νῦν. ἀλλὰ φησὶ Πτολεμαῖος ὁ Κλαύδιος (*Geogr.* I 17, 4) παρὰ τῶν ὡς ἑαυτὸν ἀπὸ τῆς Ἰνδικῆς ἀφικομένων πυθέσθαι ὡς τὰ ἀνατολικώτερα τῆς τῶν Σινῶν τε καὶ Σηρῶν χώρας λίμναι τε εἶναι καὶ ἕλη ἐν οἷς καλάμους φύεσθαι μεγάλους. εἶναι μὲν οὖν τὰ ἕλη ταῦτα καθ' ἅπαν τὸ τῆς οἰκουμένης πλάτος οὐ πιθανόν, ἀλλ' ἀνάγκη, οὗ μὴ τὰ ἕλη ταῦτα ἐφικνεῖται, ἐς ὠκεανόν τε καὶ πέλαγός τι ἀδιεξίτητον τελευτᾶν τὴν οἰκουμένην ἔξω τοῦ πρὸς τὴν κατεψυγμένην ὄρου. εἴτε γὰρ μετὰ τὰ ἕλη ταῦτα, εἴτε καὶ μεθ' ἑτέραν αὖ χώραν, ἀνάγκη ὠκεανὸν ἐκδέχεσθαι, ἐς ὃν καὶ τὴν τῶν ἀνθρώπων ἂν οἴκησιν πάντως καταντᾶν, ὡς οὐκ ἂν πάντοθεν ὑπὸ τῶν ἑλῶν κωλυομένην. ἀλλ' ὃ φαμέν, οὐχ ἱστόρηται μέχρι νῦν ἡμῖν περὶ ἑῴου ὠκεανοῦ οὐδέν.

8. Ἡ δ' Ἰνδική τε καὶ Ἐρυθρὰ καλουμένη θάλαττα κατὰ μὲν τὴν ἑῴαν αὐτῆς πλευρὰν ἄχρι Καττιγάρων ἱστόρηται, κατὰ δὲ τὴν ἑσπερίαν ἄχρι Πράσου ἀκρωτηρίου, ὃ δὴ πρὸς τῇ Ἀγισύμβῃ Αἰθιόπων χώρᾳ ἐστί. τὸ δὲ πρὸς νότον πᾶν τοῦ πελάγους τούτου οὐ πάνυ τοι ἔγνωσται, ὥστ' ἀμφισβητεῖσθαι ἂν καὶ περὶ ταύτης τῆς θαλάττης εἴτε καθ' ἑαυτὴν καὶ αὕτη ἐστίν, ὥσπερ γε καὶ ἡ Κασπία, εἴτε καὶ συμβάλλει τῷ ὠκεανῷ · καὶ εἰ συμβάλλει, εἴτε ἐπὶ τὰ πρὸς ἕω τε ἅμα καὶ νότον ἐπιστρέφουσα μετὰ τὰ Καττίγαρα συμβάλλει, εἴτε ἐπὶ τὰ πρὸς νότον τε αὖ καὶ ἑσπέραν μετὰ τὸ Πράσον ἄκρον.

9. Εἰ δὲ δεῖ τι καὶ ἡμᾶς περὶ τῶν τῆς ἐγνωσμένης ἡμῖν οἰκουμένης περάτων ἀκριβέστερον Στράβωνος εἰπεῖν, πρὸς μὲν νότον ἡ Ἀγίσυμβα Αἰθιόπων χώρα ἱστόρηται ἐσχάτη, πρὸς ἕω δὲ Σῖναι τε καὶ Σῆρες, Σῖναι μὲν νοτιώτεροι Σηρῶν, Σῆρες δὲ Σινῶν βορειότεροι οἰκοῦντες. ἀλλὰ ταῦτα μὲν οὐ τῆς ἁπλῶς οἰκουμένης ἴσως, ἀλλὰ τῆς ἡμῖν ἐγνωσμένης εἴη ἂν ἔσχατα · οὐ γάρ πω ἴσμεν εἴτε οἰκήσιμα καὶ τὰ ἔτι προσωτέρω τούτων εἴτε καὶ μή · τὰ δ' ἐξῆς ἤδη καὶ τῆς ἁπλῶς οἰκουμένης. πρὸς μὲν γὰρ βορᾶν ἥ τε Περμία χώρα ἐσχάτη ἐστὶ καὶ νῆσος ἡ Δάτεια, ὧν τὰ βορειότερα οὐκ ἔτι οἰκήσιμα · πρὸς ἑσπέραν δὲ καὶ κατ' αὐτὸν Στράβωνα (119) τὸ Ἱερὸν ἀκρωτήριον Ἰβηρίας δυσμικώτατον. αἱ γὰρ Μακάρων Νῆσοι διὰ τὸ δυσεπίμικτον ἡμῖν τε πρὸς ἐκείνους κἀκείνοις πρὸς ἡμᾶς οὐδ' ἂν ἐν δίκῃ τι τῆς καθ' ἡμᾶς οἰκουμένης μέρος εἶεν. τὸ δ' Ἱερὸν τοῦτο ἄκρον κἂν στήλη τις τοῦ τῆς καθ' ἡμᾶς εἴη

οἰκουμένης δυσμικωτάτου πέρατος. οὐ γὰρ οὐδὲ περὶ τὸν Πορθμὸν χειροποίητοί τινες φαίνονται στῆλαι, καὶ ὅμως τὰ πρὸς αὐτῷ ὄρη, τήν τε Κάλπην τὴν ἐν τῇ Εὐρώπῃ τόν τε ἐν τῇ Λιβύῃ Ἄβύλικα, στήλας οἱ πλείους τίθενται. ἀλλ' αὗται μὲν τῆς καθ' ἡμᾶς τε καὶ ἐντὸς θαλάττης στῆλαι εἶεν ἄν, τῆς δ' οἰκουμένης τὸ Ἱερὸν ἀκρωτήριον, τῆς γε δὴ καθ' ἡμᾶς τε ταύτης καὶ τοῦ ἰσημερινοῦ βορειοτέρας · περὶ γὰρ τῆς ἀντίχθονος, κἂν εἰ ταύτῃ κἀκείνῃ συνεχής ἐστιν, ἀλλά γε ἡμεῖς οὐκ ἴσμεν ὅπῃ κἀκείνης ἡ πολλὴ ἔχει θέσεως ἔξω σμικρῶν αὐτῆς ἐνίων μερῶν τῶν ἐντὸς τῆς ἀμφισκίου ἱστορημένων ζώνης.

10. Ἃ μὲν οὖν ἄξια λόγου τῶν Στράβωνι οὐκ ὀρθῶς ἐν τῇ γεωγραφικῇ λεγομένων ταύτῃ ὑφηγήσει ταῦτ' ἔστι τε καὶ τοιαύτης τῆς γε διορθώσεως πρὸς ἡμῶν τυγχάνει. εἰ δέ τι αὐτῷ καὶ ἄλλο οὐκ ὀρθῶς λέγεται, οὐκ ἂν δὴ μέγα τι εἴη. τὰ δὲ πολλὰ αὐτῷ εὖ τε καὶ καλῶς λέγεται.

It does not seem necessary to give a translation of the Greek text in full, as the following discussion repeats the gist of all the important matter it contains.

As we have already said, the treatise refers only to the portion of STRABO excerpted in the first chapter (II 118-131) (5), which deals with the shape of the inhabited world (*οἰκουμένη*). The restriction was not fair to STRABO, since some of the points PLETHO seizes for correction were incidental here and had been more fully and correctly treated by STRABO elsewhere. This is true of the remarks on the torrid zone, the meridians, and the boundary of Libya and Asia (§§ 2-4). The only fair point PLETHO makes against STRABO is the first, that the Caspian is an inland sea, not a gulf of the ocean, as STRABO thought.

In making these corrections PLETHO might be supposed to have drawn on the common knowledge of his day. But there was little common knowledge of geography in the Byzantine world, and PLETHO's information is actually drawn from specific sources. Aside from the citation of ARISTOTLE in § 1, all he says in these first four paragraphs is based on the *Geography* of PTOLEMY, who is cited by name later on (§ 7). The shape of the Caspian, the convergence of the meridians, the boundaries of the continents (cf. PTOL. *Geogr.* II 1, 5), are all reflected from PTOLEMY's work,

(5) The names of the Pillars of Hercules, Calpe and Abylix (§ 9), must be taken from STRABO outside the excerpt.

and data used in the treatment of the torrid zone, in § 2, the "Mountain of the Moon from which the Nile is supplied" and the "Agisymba country of the Ethiopians," can be from no other source. With these data PLETHO has combined a little reasoning of his own, which is scarcely successful. His notions that in the torrid zone the plains are desert and the mountains well-watered, and that the Nile floods are due to winter rains south of the equator, both ignore the essential fact of equatorial and tropical rains. The Nile floods are due, as current events have reminded us, to summer rains in Abyssinia, which is north of the equator (cf. STR. XV 696, XVII 789).

After brushing aside these preliminary points (§§ 1-4) PLETHO approaches the really important questions which the excerpt from STRABO would raise for an educated reader of the early Renaissance, namely, the limits of the inhabited, or rather, of the known world. The rest of the treatise is a survey of the margins of the *οἰκουμένη*; and we may say at once, to offset its defects, that it is scientific and free from superstition. PLETHO knows that the world is round and that only a small part of its surface has been explored. He uses reliable sources for what is known; and for what is beyond he does not resort to deserts and monsters, like mediaeval or even classical cartographers (cf. PLUTARCH, *Theseus* 1), but by free conjecture opens up the various possibilities of unknown lands and seas. At one point he almost envisages an America beyond Asia (§ 7, *εἴτε γὰρ μετὰ τὰ ἕλη ταῦτα, εἴτε καὶ μεθ' ἑτέραν αὖ χώραν, ἀνάγκη ὠκεανὸν* [sc. *Ἀτλαντικὸν*] *ἐκδέχεσθαι*, cf. STRABO I 64 f., II 102).

The survey begins with northern Europe, for which PLETHO had new information from contemporary sources. A map which PAUL the Florentine had received from a man from Dateia portrayed the region of Scandinavia (§ 5). MORELLI (*op. cit.*, p. 246) perceived that this Paul was the well-known geographer PAOLO TOSCANELLI (1397-1482) and that PLETHO probably met him at Florence in 1439. The man from Dateia has also come to light. He was CLAUDIUS CLAVUS, a Dane, who wrote a treatise on the geography of his native country, based on PTOLEMY, but entirely remaking the map of Scandinavia (6). His treatise

(6) BJÖRNBO and PETERSEN, *Der Däne Claudius Clausson Swart (Claudius*

existed in two redactions, one before 1427, preserved in a MS. of PTOLEMY at Nancy, and one after 1425, the text of which is preserved in two Vienna MSS. and the map in the atlases of the cartographer NICOLAUS GERMANUS, who worked at Florence in 1465-1470 (7). The map TOSCANELLI showed PLETHO was probably the lost original of the second redaction. The long narrow passage between the island of Dateia and the mainland to the north of it is mentioned several times in the Vienna text and appears in NICOLAUS' maps, but not in the Nancy text or map. The island of Dateia is the Scandinavian peninsula; and the peninsular "promontory on the meridian of Ierne and the parallel of Thule" is the island of Greenland. Again how narrowly America excapes mention in this pre-Columbian, Byzantine document !

This paragraph (§ 5) of PLETHO's treatise throws light on several contemporary matters. It brings the whole Marcian corpus of PLETHO's excerpts into the latter part of his life, after he attended the Council of Florence in 1439, and extends the known range of his interests in this busy period. It brings PLETHO into connection with TOSCANELLI, and TOSCANELLI with CLAUDIUS CLAVUS. Probably NICOLAUS GERMANUS also, like PLETHO, had CLAUDIUS CLAVUS' map from TOSCANELLI. These connections may be of use in tracing influences during this important period in the history of geography.

After PAOLO TOSCANELLI and CLAUDIUS CLAVUS, PLETHO quotes accounts from Russia (§ 6) which mentioned the Cold (*sc.* White) Sea, the Dvina River (*Τιβηνός*), and interior lakes (Onega, Lagoda ?), with the tribes Permii, Mordibes, and Mestores. There is also a quaint description of white seals. I am unable to identify the sources of this information. A search through the published facsimiles of contemporary maps showed that the names mentioned were not known in Italy for some time after PLETHO, nor could I find them in Byzantine literature (8). I finally submitted the

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Clavus), der älteste Kartograph des Nordens, der erste Ptolemäusepigon der Renaissance (Innsbruck 1909).

(7) JOS. FISCHER, *De Cl. Ptolemaei vita operibus, Geographia praesertim eiusque fatis* (Leiden 1932).

(8) I find the statement in various encyclopedias that *Permia* was known to Byzantine annalists, who derived the name from *πέραν*; but I have been unable

passage to Dr. E. HONIGMANN of Brussels, whose work on Byzantine geography is well known. Dr. HONIGMANN kindly permits me to quote his reply : "Auch ich vermag vorläufig die Quelle PLETHO's nicht zu ermitteln, es sei denn, dass er gerade auf eine Stelle bei LAONIK. CHALKOKONDYL. zurückgeht (p. 132 ed. Bonn = I p. 123, 9.11 ed. DARKÓ), an der die *Permioi* als Jäger bezeichnet werden, und wo der Text dann mitten im Satze abbricht. Die *Mordibes* sind gewiss die Mordvinen, Bewohner von *Mordia* (KONSTANT. PORPH., *de adm. imp.* 37, ed. Bonn. p. 166, 13). Die *Mestores* halte ich für einen dritten finnischen Volksstam, die Meščeren (Meščerjaken), die einst zwischen den Mordvinen sassen, jetzt unter den Baškiren wohnen (VAMBÉRY, *Ursprung der Magyaren*, 447 s.). Cf. IORDAN. ed. MOMMSEN, *Mon. Germ. Hist., Auct. Ant. V*, p. 88, 9 : *Mordens, Imniscaris...* (?). Die Dvina *(Tibinos)* wird meines Wissens sonst von den Byzantinern nicht erwähnt (cf. *Thividos* bei IORDANES?)." It appears, therefore, that PLETHO's information about northern Russia was not only near the truth but also the first to find record in foreign lands.

From northern Europe PLETHO turns to the Far East (§ 7), but here he disappoints us. He informs us merely that beyond the Scythians and Indians of STRABO dwell the Seres and Sinae, whom he knows from PTOLEMY. Beyond this he resorts to conjecture. He is ignorant of the travels of MARCO POLO and ODORICO DA PORDENONE, both of whom passed by sea between Ormuz and China. Their travels had been published in Italy over a century and had thus settled the question of the Eastern Ocean, concerning which PLETHO says positively that no reports were available. He can scarcely have discussed this matter with TOSCANELLI, or else he would have known better.

The end of the survey touches briefly (§ 8) on the question of the circumnavigation of Africa, which PLETHO again treats on the basis of PTOLEMY. But the Portuguese discoveries were just beginning in PLETHO's time and contemporary knowledge of southern Africa had not yet improved on the ancient tradition.

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to find the references. The *Permiani* are also described in the world map of Fra MAURO (Zurla, pp. 26, 31; see note 9 below), who among other details agrees with CHALCOCONDYLAS and PLETHO that they live by hunting *(vivono de cazason)*.

PLETHO's discussion, in spite of its antique sources, is sufficiently up-to-date to escape criticism.

There follows a summary (§ 9), including some rather puerile remarks on the west end of the *οἰκουμένη* with its *στήλη* in the Sacred Cape in Spain, and a conclusion (§ 10) very flattering to STRABO. The treatise is weakest as a criticism of STRABO, partly because it restricts itself to only a small portion of his work, but chiefly because it ignores entirely the historical point of view. However, after a series of unfair reproaches, it concludes by reassuring us that there are no other great errors and that STRABO is usually very correct; and this is a gross exaggeration in the other direction.

As contemporary geography PLETHO's work may best be appreciated by comparing it with the famous world map of Fra MAURO in Venice (9), which was drawn about a decade later (ca. 1457). The Italian shows much greater command of empirical information. In his maps the outlying portions are packed with ample and vivid topographical and ethnological material for regions where PLETHO had only PTOLEMY's barren data with meagre supplements. But on the theoretical side PLETHO has the advantage. Fra MAURO's map is a circle into which the *οἰκουμένη* is crushed without regard for its actual shape, and it is completely surrounded by the ocean. It ignores longitude and latitude and the spherical shape of the earth. It is in fact still in the tradition of mediaeval lore, while PLETHO is in the tradition of classical science.

The preceding analysis shows that aside from the two contemporary sources on Scandinavia and Russia and a couple of stray quotations from ARISTOTLE (§ 1) and STRABO III (§ 9), PLETHO's treatise is no more than a comparison of the excerpt from STRABO II with PTOLEMY (10). This fact deserves attention because in PLETHO's time PTOLEMY was just gaining ascendancy over contemporary geography. In the next generation (1450-1500) carto-

(9) P. ZURLA, *Il mappamondo di Fra Mauro* (Venice 1806); *Enciclopedia Italiana* XXII (1934), p. 620. The map is reproduced in SANTAREM, *Essai sur l'histoire de la cartographie* (Paris 1849 ff.), III[e] Partie, and THEOBALD FISCHER, *Raccolta di mappamondo e carte nautiche del XIII al XVI secolo* (Venice 1871 ff.), pt. 15.

(10) Notice that in § 10 PTOLEMY's title *γεωγραφικὴ ὑφήγησις* is transferred to STRABO.

graphy was revolutionized by this influence; but to my knowledge no Italian copies of Ptolemaic maps are demonstrably earlier than 1439 (11). PLETHO, however, must have studied PTOLEMY's maps as well as his text to acquire such a visual conception of the configuration of the οἰκουμένη and its parts as this treatise displays. He attempts to combine his Russian source with PTOLEMY just as CLAUDIUS CLAVUS had done for Scandinavia (§ 6) (12). If CLAUDIUS CLAVUS was the first ἐπίγονος of PTOLEMY in the Renaissance, PLETHO may have been the second; and if PLETHO's visit to Florence in 1439 was a great moment in the Platonic tradition, his conversations with TOSCANELLI on the same occasion may also have been momentous for the Ptolemaic tradition in geography (13).

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(11) The Latin translation of PTOLEMY's *Geography (Cosmography)* by JACOBUS ANGELUS in 1406 did not have maps. The evidence that the great Urbinas atlas (FISCHER's A1) was in Italy and that the Badia apograph (A6) was made from it in the early part of the 15th century is all very weak. The precise age and provenance of the Leiden apograph (A11) and of the later B-MSS. are not known; and in any case these Greek atlases had no influence on Latin cartography. The earliest evidence of the maps in Latin is the Nancy atlas (L2) which contains the 26 Ptolemaic maps transcribed *ex greco exemplari* for Card. GUILLAUME FILLASTRE of Rheims in 1427, as well as CLAUDIUS CLAVUS' additional map of Scandinavia with text in the earlier redaction. See the detailed description by STORM quoted in BJÖRNBO and PETERSEN, *op. cit.*, pp. 103-106. STORM assumes that this atlas was made in Italy. However, a Ptolemaic atlas was brought down to Italy from France in 1431-2 by Card. GIORDANO ORSINI (FISCHER, p. 174 n. 1), who had accompanied FILLASTRE on a papal mission to France in 1418 and had received CLAUDIUS CLAVUS in Rome in 1424 (BJÖRNBO and PETERSEN, pp. 195 f.). FILLASTRE had died in 1428, and it is possible that his Greek exemplar was the atlas ORSINI later brought to Italy and also that it was none other than the Urbinas itself.

(12) PTOLEMY (V 8, 7; map xvi) makes the Rhas River (Volga) rise from mountains; but PLETHO, following his Russian accounts, makes it rise from lakes. On PTOLEMY's maps (viii and xvi) the line between Europe and Asia is drawn from the source of the Tanais straight north into unknown space; but PLETHO connects it with his newly discovered Cold Gulf.

(13) There are two other connections between PTOLEMY's *Geography* and PLETHO. An excerpt on the Peloponnesus from PTOL. III 14, 25-43 is associated with PLETHO's discourses on the Peloponnesus in several MSS. (Vatic. gr. 2236, Ambr. gr. 348, etc.), and hence has been ascribed to PLETHO. The excerpt is taken from the Urbinas, since it includes its secondary annotations; but it may not be by PLETHO. DEMETRIUS CALDERINUS in the preface to the Rome 1478 edition of the *Geography* says he had used a manuscript annotated by PLETHO. Nothing more is known of this statement (see FISCHER, *op. cit.*, index *s.n.* GEMISTUS PLETHO).

The birthplace of Jan Swammerdam 1637-1680

The celebration in Holland this year of the tercentenary of the birth of JAN SWAMMERDAM in Amsterdam on Feb. 12th, 1637 has drawn attention to the fact that the house where he was born, lived and probably died has been scheduled as uninhabitable and may soon be demolished. The house in question is No. 18 in the Oude Schans. As it is at present there is little to be said in favour of its retention, but an old print in the Amsterdam Archives shows us the house as it was in SWAMMERDAM's time. Unhappily the ground stage is obscurred by a hut standing on the canal side. We reproduce an enlargement of a portion of this print showing a block of four houses of which SWAMMERDAM's was the third from the left. It was quite a happy chance that it was included in the picture, which was taken to illustrate the general appearance of this ancient part of the town. The house, which was called " de Star ", and was distinguished by a six-rayed star in the gable of the pediment, is now minus the pediment and the whole of the stone ornament of the front elevation, so that it has lost all its distinctive and charming features. The other three houses in the block have suffered equally. SWAMMERDAM's father, the druggist, bought the house in 1636, and it went out of possession of the family in 1716. In 1880 a tablet was placed over the middle window of the first floor bearing the following inscription : "Jan Swammerdam, 1637-1680. Zyn onderzoek der natuur blijft een voorbeeld voor alle tijden, 17 Febr. 1880."

I am indebted for the photograph and the above details to Dr. H. ENGEL, Zoölogisch Museum, Amsterdam.

(*University of Reading*) F. J. COLE.

The birthplace of J. SWAMMERDAM

Sir John Freind (1675-1728) M. D. Pioneer Historian of Medicine (*)

In a recent essay on JOHN FREIND, Major GREENWOOD wrote : "In English annals of medicine he makes a great figure. He is one of the heroes of the London College of Physicians. I have heard a president of the college of our own generation say that while it was sufficient to have a copy of one edition of most men's works, he was glad to possess every edition of FREIND's *History of Physick*" (1).

This recent tribute to an eighteenth century history of medicine (2) is an indication that it is not altogether without importance for the history of science.

It may be worth noting that little attention was paid to the history of medicine in the seventeenth and even in the eighteenth century. The few works published prior to LE CLERC's *Histoire de la Médecine* (1696) were largely concerned with the lives of the physicians and the history of medical sects (3). LE CLERC's more extensive work covered the period from HIPPOCRATES to GALEN. The first section was devoted to HIPPOCRATES, the second to CHRYSIPPOS OF CNIDOS and the progress in anatomy, and the third to GALEN. It was only in an edition published in 1723 that he

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(1) Major GREENWOOD, *Medical Dictator*, London 1936, p. 40.

(2) JOHN FREIND, *History of Physick* from the time of GALEN to the beginning of the sixteenth century — chiefly with regard to practice. London 1725-1726.

(3) A few examples cited by LE CLERC in his preface to *Histoire de la Médecine* are : (1) PIERRE CASTELLANUS (Professor of Greek at Louvain), *Des Vies des médecins tant anciens que modernes* (1618), (2) BRUNSFELSIUS, *Catalogue des illustres médecins*, (3) NEANDER, according to LE CLERC published a book in 1623 on origin of medicine and its sects, but he only copied from CASTELLANUS. (4) WOLFGANGUS JUSTUS, *Chronologie des médecins*, (5) CHAMPERIUS, REMAELUS, PENCERUS and others wrote on the same subject. (6) Only LIONARDO DI CAPOA, a physician and philosopher of Naples, wrote a book which comes nearest to a history of medicine.

added a suplement of fifty-six pages that outlined briefly the history of medicine from the time of GALEN to the middle of the sixteenth century (4).

Before the appearance of FREIND's *History of Physick* which was concerned with the period since GALEN, there were published two books on the subject : one by BARCHUSEN (BARCKHAUSEN) (5) entitled, *Historia Medicinae* (1710) which dealt with the history of medical sects, the other by GOELICKE (6), entitled *Historia Medicinae Universalis* (1721). This work was divided into the following parts : (1) antediluvian epoch, (2) the Egyptian period, (3) the period from AESCULAPIUS to HIPPOCRATES, (4) the Hippocratic period, (5) the post-Hippocratic period to the Alexandrian school. FREIND in his *History* refers occasionally to BARCHUSEN's work but not to GOELICKE. In 1728, three years after the publication of FREIND's work, J. H. SCHULZE, (7) a German physician and classicist published *Historia Medicinae*, treating the history of medicine from the time of the deluge to 149 B. C. In a compendium published in 1741 he continued his history to 138 A. D. (8)

A number of physicians interested in special branches of medi-

(4) See D. LE CLERC, *Histoire de la Médecine*, Paris 1723.

(5) BARCHUSEN or BARCKHAUSEN was born in Westphalia in 1666. He lectured in chemistry in the University of Utrecht. As a physician he belonged to the iatrochemical school. In 1710 he wrote the history mentioned above. His chief purpose in writing it was to make known the different theories prevailing in medicine without regard to practice. See *Dictionnaire des Sciences Médicales*, Paris 1820, Volume I. See also C. DAREMBERG, *Histoire des Sciences Médicales*, Paris 1820, Vol. I, p. 34.

(6) A. O. GOELICKE, German physician, born in Nienberg 1670 or 1671. Received the degree of Doctor of Medicine in 1705. Taught medicine in University of Duisburg in 1713 and then in Frankfurt a. Oder where he remained till his death in 1744. Was opponent of iatrophysical school. See *Allgemeine Deutsche Biographie*.

(7) J. H. SCHULZE, German physician and polyhistor, born in 1687 in a village near Magdeburg. Studied medicine in the University of Halle, also theology and philology. In 1708 taught botany and anatomy in the Pedagogium in Halle, later Greek and Hebrew, and finally geography. In 1715 he returned to the practice of medicine, and received the M. D. degree in 1717. Finally, in 1732, he taught medicine in the University of Halle as well as rhetoric and antiquities. He died in 1744. In his history of medicine, SPRENGEL calls him a polyhistor in the finest sense of the word, and "*the first true historian of medicine*." See *Allgemeine Deutsche Biographie*.

(8) C. DAREMBERG, *op. cit.*, V. 1, p. 34-35.

cine paid some attention to the history of the progress made in those branches. ASTRUC (9), for example, in his book on *Diseases of Women*, (1767) devoted a few sections to the history of the subject.

For the first half of the eighteenth century, then, JOHN FREIND's work may be considered a pioneer effort in the field of medical history. Since only four or five other works followed his throughout the entire century, its significance for the student of the history of science is even further enhanced.

Specifically this work may be of value for two reasons. First, an examination of a work more or less representative of the eighteenth century may add to our knowledge of the progrees of medicine in the eighteenth century. Secondly, something might be learned about the method and approach used in recording the history of medicine in that century.

It is with this aim in view that the following examination of FREIND's *History of Physick* is made.

The first question that might be raised in this connection is how well fitted our author was for such a task. According to the reports of his biographers he was quite proficient in the classics. In fact when he was a student in Christ College at the age of 19, in 1694, he already attracted the attention of the dean. The latter thought so much of his attainments in classical studies that he encouraged him to edit both the Greek and Latin versions of AESCHINES' and DEMOSTHENES' orations (10). This fact, says one modern writer, "is not conclusive proof that he was a competent Greek scholar; but there is no doubt at all that by the time he graduated in medicine (M. B. 1703, M. D. 1707) he knew a great deal more Greek and Latin than ninety-nine per cent of the present fellows of the College of Physicians." (11) Nevertheless, other writers thought much more of his knowledge of the classics. Thus one medical biographer said that in 1703 FREIND "gave a solid proof of his professional and classical attainments by the

(9) J. ASTRUC, *Treatise on the Diseases of Women*, London 1767, Ch. VII is entitled, History of the progress which has been made in the knowledge of the formation and growth of the human foetus. (1) What ancient physicians knew of the formation of the foetus, (2) What modern physicians have discovered.

(10) CHAUFPIE, *Dictionnaire Historique*, art. J. FREIND.

(11) Major GREENWOOD, *op. cit.*, *p.* 43.

publication of his *Emmenologia*. — This work has always been reckoned as an excellent performance; and is admirable for the beauty of its style, elegant disposition of its parts, its wonderful succinctness and perspicacity and for the happy concurrence of learning and penetration visible throughout the whole". (12) But if this praise may sound somewhat extravagant, it is evident that he had enough of a command of Latin to write a medical work in it.

In addition to his devotion to the classics, he was very much influenced by the great scientific achievements of his time. As a disciple of NEWTON he applied himself to the study of mathematics because he thought it " not only contributed to a closer way of thinking and reasoning upon the truth of things, but it is also advantageous to several other studies, and particularly to that of Physick to which he had designed and determined himself from his youth". (13) This interest in mathematics and Newtonian physics accounts for his adherence to the iatro-physical school in medicine.

Nor did he neglect the study of chemistry. In 1704 he was appointed reader in chemistry at Oxford. In his lectures published in 1709, as *Praelectiones Chymicae*, he applied NEWTON's laws of nature to chemistry. In one lecture he observed that most writers of chemistry were deficient in what pertained to the theory of chemistry, and that no one contributed as much to the improvement of this science as BOYLE. (14) For BOYLE had suggested that chemistry be separated from alchemy and medicine, and that chemists should be more concerned with making experiments and collecting observations than with establishing premature philosophies upon them.

So much for his classical and scientific training. In his own chosen field of medicine, he made a number of contributions. He first appeared as a medical author in 1699 when he wrote a letter to HANS SLOANE on *Hydrocephalus*, which was later published in *Philosophical Transactions*. In 1703 he wrote another letter, entitled *De Spasmi Rarioris Historia*, in which he gave an account of some extraordinary cases of convulsion that occurred in Ox-

(12) BENJ. HUTCHINSON, *Biographia Medica*, 2 vols. London 1799, VI, p. 316.
(13) J. FREIND, *History of Physick*, 4th edition, 1750. Introduction p. 6.
(14) CHAUFFIE, *op. cit.*

fordshire. The medical biographer mentioned above adds that these cases "made a very great noise at that time and might probably have been magnified into something supernatural if our author had not taken great pains to put them in their true light." (15) Thus in a century that had not yet completely discarded the superstitions of the past, FREIND appears as one of the champions of science and reason. In 1703, he published the *Emmenologia*, already mentioned above, in which he attempted to explain menstruation wholly on mechanical principles. In 1716 he published the first and third books of HIPPOCRATES' treatise on epidemics together with a commentary on fevers.

If these contributions to medicine are not very formidable, they are not much less important than those of his better known contemporaries. For what can be said about the contributions of the leaders of the profession in his time? According to GARRISON, SYDENHAM, who lived till about the end of the sevententh century, "stood off from all medical theorizing and scientific experimentation, disregarded all predecessors save HIPPOCRATES and knew nothing whatever of VESALIUS, HARVEY, MALPIGHI, or MAYOW. — Pathology (for him) was summed up in the Hippocratic theory of concoction of the humors and the subsequent discharge of the materies morbis." (16) As for BOERHAAVE (1668-1734), ALLBUT says that he also made no attempt at experimentation in medicine, but "seems to have contented himself with hashing up the partial truths and entire error of his time." (17) Although he studied BOYLE, MALPIGHI and SWAMMERDAM, he still "tied himself to groundless hypotheses, in opposition to the very principles he advocated so strongly." (18) FREIND, on the other hand, was very much in sympathy with the scientific advance. Thus in 1719 he delivered the Harveian oration at the London Royal College of Physicians. If the iatro-physical school in medicine was not successful in solving all the problems of medicine, it had at least a rational basis. Yet it must not be implied that FREIND was as great a physician as either of the two mentioned. But

(15) BENJ. HUTCHINSON, *op. cit.*, p. 316.

(16) F. H. GARRISON, *An Introduction to the History of Medicine*, Philadelphia, 1917, p. 261.

(17) T. C. ALLBUTT, *British Medical Journal*, (London 1900, II) p. 1850.

(18) LIBBY, *History of Medicine*, p. 159

rather that even the best of the eighteenth century physicians failed to make important contributions to medicine.

Considering, then, FREIND's training and experience — he had a wide medical practise in the West End of London from 1712 to 1728 — he was fairly well equipped for undertaking the task of writing a history of medicine.

FREIND's attitude toward the past is revealed in his criticism of his predecessor in this field. Thus one reason he gave for writing his history was LE CLERC's failure to give more than passing notice to the four physicians of the Byzantine period, namely ORIBASIOS, AETIOS, ALEXANDER OF TRALLES, and PAULOS OF AEGINA. LE CLERC, he claimed, allotted very little space to these men on the ground that they were only compilers. That fact, he argued, did not justify omitting complete accounts of their works. "For isn't it just as important for the historian to observe the course of their decline by an examination of their writings as to trace the steps in their rise?" (p. 3) (*)

This is, no doubt, a pretty good principle to follow in recording past events. But FREIND, in seeking a reason for his own labors, was in this criticism somewhat unfair to LE CLERC. Apparently FREIND missed the point of LE CLERC's supplement to his *Histoire de la médecine*. The latter never intended his 56-page supplement for a history of medicine from the time of Galen to the middle of the sixteenth century. It was to serve merely as a guide for such a history.

However, FREIND was on sounder ground when he criticized LE CLERC's chronology. The latter, for example, placed both ORIBASIOS and ALEXANDER in the fourth century and AETIOS and PAULOS in the fifth. How can we measure the progress made by any individual, he asked, if we are not clear on chronology (p. 9)? Throughout his two volumes it may be noted, he is always careful in determining accurately the chronology of the individuals he treats.

But if LE CLERC might be criticized for faulty chronology, FREIND may be called to task for his own shortcomings. "All historians", we read, "even the best of them give a very confused

(*) All page references are to J. FREIND, *History of Physick*.

account of the age wherein these writers (mentioned above) lived" (p. 3). This was the reason for the bad chronology. He made no attempt, however, to set matters straight, by presenting the reader with an historical survey of the period in which these men lived and worked. He seemed to have taken for granted that the readers of his work will not be concerned with the general state of civilization in the post-Galenic period and the place of medicine in it. It would seem that his main concern was with the practice of medicine. All that he was interested in was the practical suggestions of great physicians in all ages that might be helpful to the practicing physician of his day. He was also interested in showing up the physicians of his own time. Time and again we read that many of the remedies that his contemporaries considered modern inventions had a long history sometimes reaching as far back as the Roman period. Apparently, what lesson was to be derived from that? That there was much that the ancients could teach FREIND's contemporaries. And that it would do them all a lot of good to read the ancient authors. Despite, then, the scientific revolution of the seventeenth century, and the special attacks on Galenic physiology and anatomy made by VESALIUS and HARVEY's work, and others, there was still a good deal to be found in the ancient authors that an eighteenth century physician could use. This continued divorce of theory and practice may perhaps account in part for the slow progress of medicine in the eighteenth century.

FREIND's *History of Physick* fulfilled a definite need in his time, since he treated a period that had been all but neglected by other writers. Most of them did not carry their accounts beyond the time of GALEN. LE CLERC in his 1723 edition did realize the need of a history of the period since GALEN. But all he offered was an outline that might serve as a basis for such a continuation. Hence FREIND's two volumes treating the history from the time of GALEN to the early sixteenth century were a welcome addition. Between 1725 and 1727, three editions appeared in English. In 1727 a French translation by STEPHEN COULET was published. In 1734 a Latin translation by JOHN WIGAN, and finally in 1750 a fourth English edition appeared (19).

(19) CHAUFFIE, *op. cit.*

His first volume is devoted to the history of medicine in the Byzantine Empire. The greater part of it is concerned with the four physicians LE CLERC treated so briefly, namely ORIBASIOS, AETIOS, ALEXANDER OF TRALLES, and PAULOS OF AEGINA; and yet we do not get a systematic treatment of each of these men. Since his primary interest was practical therapeutics, there was no attempt made at a systematic summary and evaluation of the medical literature. His chief concern was to glean from their writings suggested treatments that might be helpful to the practicing physician or that might prove that eighteenth century practices were not very different from those of the fourth century to the seventh century.

His preoccupation with these four physicians also led him to omit others of equal importance. Thus PHILAGRIOS and POSEIDONIOS, both of whom lived in the fourth century, and who achieved distinction in their respective fields, found no place in this history. PHILAGRIOS, in his work on diseases of the spleen, was comparatively free from superstition in therapeutics, and knew under what conditions the spleen undergoes enlargement, shrinkage or induration. POSEIDONIOS combatted the belief in the demoniacal origin of mental ailments, attributing nightmare to the accumulation of thick cold vapors in the brain, and convulsions in epilepsy to the presence of some foreign body in the nerve centers. (20)

Similarly except for passing notice, C. AURELIANUS, a Latin medical writer of the fourth century, had no place in this history of medicine. And yet he should have been of interest to FREIND, since he was no thorough in his discussion of disease. According to one modern authority, his book *De Morbis Acutis et Chronicis* conforms more than any other book of antiquity to modern requirements. In his discussion of disease he includes definition and nomenclature, description and aetiology, symptomology, pathology, diagnosis and treatment. (21)

The same lack of system weakens his treatment of the very men whom he proposed to discuss more fully than LE CLERC. Thus his account of AETIOS' contributions is scattered and in places incomplete. In his discussion of AETIOS' treatise on *Surgery*, he

(20) M. NEUBURGER, *History of Medicine* (English edition) London 1910, p. 305-6.

(21) *Ibid.* p. 309.

omitted his description of tonsillotomy. The same author's treatise on *Ophthalmology*,, probably the most exhaustive of antiquity, is only mentioned in passing at the end of the volume.

But if FREIND's purpose in writing this history of medicine was not primarily to give an exhaustive account of the medical literature, it is not entirely unworthy of praise. He was essentially a practical man and intended to make use of medical history to discourage medical practices that had no rational or scientific basis. Thus he was strongly opposed to the use of *nostrums* or *universal remedies* which were still the vogue in his day. He found support for his opposition in AETIOS, who, he claimed, had no use for those *nostrums*, although he mentioned them in his works as a matter of course (p. 77). It may be interesting to note that it was in this question of the use of *nostrums*, that FREIND was attacked in a pamphlet published anonymously in 1726. (22) The burden of that author's argument was that the best physicians, even BOERHAAVE made use of them. FREIND on the other hand made the point that "a man who has the least acquaintance with physick must be sensible that any universal remedy is a cheat; and though it be ever so good and valuable a medicine itself, yet it is utterly impossible it can be equally applicable to all persons in all cases and at all junctures." (p. 78) And yet such simple reasoning was not the rule in his day. FREIND in this respect was decidedly in advance of his time.

He was just as quick, however, to expose the absurdities of ancient medical practice as those of his own day. He cited in detail AETIOS' remedy for the gout, which included, besides external applications, a special diet for each month of the year, as for example, milk for the month of September, garlic in October, or a glass of wine in the morning in January. Then he added, "and I dare say whoever will have patience to go through such a regimen for so long a time together, will complain less of the gout than we find they do in our modern times." (p. 80)

And at the same time FREIND found many medical practices had not changed much since the time of AETIOS. In case of a bite of a mad dog, for instance, AETIOS' advice to keep the wound open for forty or sixty days, was still followed in his own day. Likewise the use of charms and amulets as cures in agues, stone, colic,

(22) C. W., *Observations on Dr.* FREIND's *History of Physick*, London 1726.

and gout, which ALEXANDER OF TRALLES advocated, was not altogether out of date in FREIND's day. Thus we read — "It has been the fashion almost ever since [TRALLES] that the use of magical applications has prevailed in these distempers." (p. 85)

In his account of ALEXANDER OF TRALLES, he recognized his originality and superiority to the other physicians of his time. And yet as we have just noted above, even he was not completely free from superstition. FREIND thought that ALEXANDER's credulity should be overlooked since not even in modern times were people completely free from it. Furthermore, he chose to emphasize ALEXANDER's critical attitude toward GALEN. This physician, said FREIND, was not a mere copier of GALEN. He was ready to dissent from GALEN whenever, in the light of his own experience, he was certain that GALEN was wrong. In support of his attitude ALEXANDER quoted the famous saying of ARISTOTLE's "PLATO is my friend, but truth much more." (p. 108) "This frankness", FREIND thought, "was very different from some admirers of GALEN who had rather err with him than be in the right with anybody else." (p. 108)

That Galenism was still strongly entrenched in eighteenth century medicine is well known. But it is questionable whether such a sceptical attitude as is evinced here by FREIND was to go a very long way in furthering scientific method in medicine. For this critical approach to GALEN was limited to an attack on specific cases rather than on fundamental principles. This history of medicine is a good example of the importance of Galenic compilers for the eighteenth century physician's practice. He may differ here and there with this or that remedy, but fundamentally the practices of GALEN and his compilers were still useful.

About PAULOS OF AEGINA (7th cent.) we learn that his book on surgery was the foundation of treatises from his time to FREIND's own day. In fact FREIND claimed that too many of his contemporaries used PAULOS' methods only under another name. Like ALEXANDER, PAULOS was no mere copier, for he too dared to differ from GALEN on occasion. He was well acquainted with the most difficult operations; understood the nature of the cases he treated and the best methods of curing them. Thus PAULOS described a bronchotomy he performed in a case of a violent quinsy. Even the Arabian physician ABULKASIM, he claimed, made use of

PAULOS' methods without mentioning his name. Accordingly it was FREIND's conclusion that little progress had been made in surgery, since both the Arabs and the Moderns were using PAULOS' methods without acknowledgement. It would seem that whatever had been done in surgery in western Europe in the Middle Ages (as for example the skill in plastic surgery of the Sicilian surgeons, BRANCAS and his son ANTONY in the middle of the 15th century) (23) had either been forgotten or was not known at all in the eighteenth century.

The period of the Greek classical physicians closed with PAULOS according to FREIND. For, we read, if any of the Greek medical writers from HIPPOCRATES to PAULOS were compared to any of their contemporaries in any other field, they were to be found "not at all inferior to them either in disposition of their matter the clearness of their reasoning or the propriety of their language" (p. 220). Granting that that was true, it did not exclude the possibility of a marked difference in the degree of originality of the Hippocratic medical writings and those of the post-Galenic period. This attempt, then, to put the writers of both periods on the same level may account for his devoting almost two thirds of his first volume to the four physicians mentioned above.

The remainder of the volume, about sixty pages, is devoted to a brief account of Byzantine medicine from the seventh to the thirteenth centuries. The decline in the medical literature of this period was obvious. The writers of this period borrowed from their predecessors without making any acknowledgements. In speaking of NONUS, FREIND remarked somewhat facetiously that he was so modest, "as to quote no author, which very well became one who had so little of his own. Nay, he is so free with the labors of his predecessors that he assumes their experience" (p. 255). And yet another historian, BARCHUSEN, who had written a history of medicine in 1710 treated NONUS as an original writer. FREIND's point was that there was nothing in these writers from PALLADIUS to MICHAEL PSELLUS that was not also in AETIOS, ALEXANDER, or PAULOS.

In speaking of ACTUARIOS, a physician of the fourteenth century,

(23) L. THORNDIKE, *Science and Thought in the Fifteenth Century*, N. Y. 1929, p. 23.

he found that his discussion of the causes of palpitation was original. For ORIBASIOS, AETIOS, and PAULOS only repeated what they found in GALEN. But this physician explained palpitation as a result of too great heat or plenitude of the blood. This, FREIND thought, was a rational explanation. But if we should find such an explanation insufficient, FREIND found some in his own day even more fanciful. He included a quotation from a German author, DOLAEUS, (24) who had written an *Encyclopedia of Medicine*, which makes rather curious reading even to-day. "Palpitation", this writer explained, "is a disorder wherein *cardi meleck*, the king, it seems, who keeps his residence in the ferment of the heart, finding himself attacked and oppressed by Civil War, raised by a disaffected party among his subjects, exerts himself all he can to drive out the enemy, and calling in to his aid his ancient ally, microcosmotor, governor of the *animal spirits* gives battle to the disturbers of his rest." (p. 265) Such talk FREIND considered idle jargon. Yet the "rational" explanation of ACTUARIOS had no greater validity.

The first volume is brought to a close with a plea for the study of ancient medical writers. He found it hard to see how physicians could be satisfied with a knowledge of a few modern systems. Although he agreed that any physician ought to make his own observations, and ought not always to yield to the judgments of the ancients, nevertheless, a knowledge of the writings of the ancients was helpful in making judgments.

About one half of the second volume is devoted to an account of the Arabs' contributions to medicine. We find a full account of how Greek learning was transmitted to the Arabs. His chief authority for this part of his narrative was ABULPHARAGIUS' (25)

(24) J. D. DOLÄUS was a German physician born in 1651. He studied medicine in Heidelberg, and then in Paris, London and Oxford. He was a follower of PARACELSUS and VAN HELMONT. In 1684 he published his *Encyclopaedia Medica*, mentioned above, and in 1689 *Encyclopaedia chirurgica rationalis*. Like many other physicians, he was a great believer in the use of universal remedies in therapeutics. In 1680 he published a work entitled, *Theatrum theriaca. coelest.* See *Allgemeine Deutsche Biographie*.

(25) FREIND probably has reference to ABU-L-FARAJ YUHANNA IBN AL-IBRI AL-MALATI (1226-1286). He was a Syriac historian, grammarian, physician, etc. and translator. His main historical work was a Syriac chronicle divided into two parts. The first part was a universal history from creation to 1286. He later abridged this section of his work, which was translated into Latin by EDWARD

History of Al-Mamun. For his account of Arab medical writers he made use of another Arabic source, namely the work of the medical historian IBN-ABI UṢAIBIA (1203-1270) entitled *Sources of Information Concerning Different Classes of Physicians.* This included information on 399 physicians and investigators. In an age when prejudice prevented an impartial view of Arabic achievements, it is gratifying to find an historian going if not to the original source, at least to a translation of the original source, for his information (25*a*).

And yet in his account of the cultural progress of the Arabs there is a tendency to minimize their achievements. If they translated PTOLEMY and cultivated astronomy, they did not make as many observations as the Greeks or as FLAMSTEAD, FREIND's own countryman and contemporary. Apparently, of Arab progress in geography nothing was known. Again we are told the Arabs did little for mathematics except to translate EUCLID badly, and APOLLONIUS' Conic Sections. But what about Algebra? Not a word of that in FREIND's account; nor of their studies of the mechanics of solids and fluids; of their work in optics; of their use of sensitive balances or of their employing the pendulum for measuring time.

The Arabs furthermore took everything from the Greeks as they found it, but added nothing. That no doubt was true in great part in medicine. But a more accurate knowledge of Arab history, which no doubt was non-existent in the 18th century, would have led FREIND to modify such a generalization. Even

POCOCKE (1604-1691) under the title : *Historia compendiosa dynastiarum historiam complectens universalem a mundo condito usque ad tempora authoris res orientalium accuratissime describens* (447 p. Oxford 1663). This translation was probably available to FREIND. See GEORGE SARTON, *Introduction to the History of Science*, 2, 976.

For IBN ABI UṢAIBIA, see SARTON, *ibidem*, 2, 685.

(25*a*) In none of the brief biographical notes is there any mention of FREIND's knowledge of Arabic. But in his section on Arabic medicine there is constant reference not only to Arabic medical works which were available in Latin, (e.g. RHAZES' Continens) but also to the Arabic historians ABULPHARAGIUS (ABULFARAJ) (1226-1286) and IBN ABI UṢAIBIA, who wrote a book on the lives of physicians. There are definite page references to ABULPHARAGIUS in Vol. II on pages 8, 9, 10 and 11. As for UṢAIBIA, a manuscript of this writer's work was in Dr. MEAD's possession. FREIND appended to his second volume the life of GABRIEL BACHTISHUA translated into Latin by SALOMON NEGRUS of Damascus from this manuscript. See FREIND *op. cit.*, Vol. II, p. 216-17 and appendix.

in practical medicine, he claimed they made no real improvements. He admitted, however, that they erected medical schools throughout their empire, and in that fashion fostered the study of medicine. Their chief function was to act as middlemen or transmitters of Greek culture to the new West when it was ready to assimilate it. This is substantially the modern point of view.

RHAZES, we read, was praised entirely too much by Arabic physicians. And yet his monograph (the earliest) on small pox and measles has been recognized in modern times as an important contribution in the history of epidemiology. Also as a clinician RHAZES was a follower of Hippocratic principles aiming at a therapeutic method that is based on observation of the course of a disease, and laying stress on hygiene and dietetic methods. FREIND, as a practical physician, should have noted these points.

AVENZOAR was praised by FREIND for rejecting all quackery including astrologer's superstitions. He also found citations of cases not given by other authors. He gave an account, for example, of a case of dysentery with which he himself was afflicted. He managed to cure it by wearing an emerald ring on his belly. In a like case, added FREIND, AVENZOAR advised taking emerald in powdered form. AETIOS, too, we learn again, found this stone useful to stopping the flow of blood. (p. 80 II) It would seem, then, that the therapeutic use of precious stones both internally and externally, so popular throughout the Middle Ages had not yet abated in the eighteenth century. And FREIND who was ever ready to denounce superstitions and irrational methods of cure, saw nothing fanciful about this one. Also FREIND did not disapprove of the use of parts of animals, such as liver and hoofs, both internally and externally (p. 92 II).

The Arabs, we learn in a concluding section on this subject, did contribute something toward medical progress. Although they did not make much progress in chemistry, they did introduce chemical medicines. Surgery did not advance. But in the time of ABULKASIM (tenth century), it was separated from medicine. Since it became an independent profession, those engaged in it acquired greater skill. By introducing aromatics from the East, they added something to materia medica. In botany, they not only described new plants but discovered properties of old ones entirely unknown to the Greeks. They also introduced reforms

in the practice of medicine. They prescribed milder purges than the Greeks. They introduced new medicines and prescribed the old ones in smaller doses. Their method of bleeding was never as excessive as among the Greeks. Thus FREIND gave the Arabs more credit at the end of his account than when he began. He admitted that he differed from the writers of the seventeenth century who thought the Arabs contributed nothing they did not borrow from the Greeks.

The treatment of the history of medicine in the Middle Ages and the Renaissance completes the second volume. We find here the traditional view of the Middle Ages — namely that there was little if any cultural progress between the eleventh and fifteenth centuries. The thirteenth century was an age of ignorance. For ROGER BACON had said that the clergy were more concerned about theology than about science. Aristotelian philosophy was condemned by the church in 1204, and scholars were more fit for a cradle than for a chair.

Nevertheless, we get a fair account (26) of whatever progress was made during that period. As might be expected, however, ROGER BACON is credited with practically all the scientific knowledge of the time. Thus chemistry known only to the Arabs, "was

(26) In giving an account of medical progress in the Middle Ages, the author includes the following :

(1) An account of the work of CONSTANTINE THE AFRICAN as a translator of Arabic medical works.

(2) An account of the founding of the medical school at Salerno and its accomplishments.

(3) The contribution of ARNOLD OF VILLANOVA.

(4) The place of the Jews as translators and medical practitioners.

(5) WILLIAM OF SALICETO.

(6) GUI DE CHAULIAC and his works in surgery.

(7) PETER OF ABANO. FREIND agreed with CHAMPERIUS that PETER "was a man of much reading and little judgment, though he went by the pompous title of Conciliator a title which he took upon himself by his own authority." p. 260 II. Here FREIND is in agreement with PICO DELLA MIRANDOLA who said that PETER was "a man fitted by nature to collect rather than to digest." Quoted by THORNDIKE, *History of Magic and Experimental Science* p. 884 II. THORNDIKE, however, thinks this judgment too severe claiming "he was no mere compiler, but something of an experimental astronomer as well as a painstaking and critical translator, voluminous commentator upon ARISTOTLE and great medical authority." THORNDIKE, *op. cit.* p. 884 II.

first cultivated by him in western Europe" (p. 233 II). And BACON said that only three others in the Roman world knew anything about the subject — one of whom was PETRUS PEREGRINUS whom he called *Dominus Experimentorum*. Since BACON (27) was the miracle of his age according to FREIND, it was not surprising that he should have made discoveries in optics, in mechanics, and in chemistry, or that he should have been the only astronomer of his age. But what may be interesting to note, is how FREIND, the scientist did not hesitate to accept an absurd tale just because ROGER BACON told it. Thus BACON told the story of a Sicilian plowman who drank from a yellowish stream (impregnated with gold) and grew young again, living many years in full vigor. This was submitted for evidence that a tincture of gold might be used to prolong human life (p. 245 II).

Another curious belief of BACON's was in the virtue of bone sometimes found in the heart of stags. Since it was the product of a vivacious animal, it was therefore serviceable for the same purpose. Now BACON told of a stag that was found in his time with a golden collar round its neck having the inscription *hoc animal fuit in hoc nemore Julii Caesaris* (p. 246 II). This story sounded even too incredible for FREIND. However, since BACON told it there must be some truth in it. What is more, the "excellent historian" P. DANIEL told of a similar incident that took place in the reign of CHARLES VI of France, who, when he went hunting in the Forest of Senlis found a stag that had a gilt copper collar with the inscription *hoc Caesar mihi donavit* (246 II).

The eighteenth century rationalist, then, who looked upon the medieval period as one of ignorance, was, it seems, not completely free from the belief in marvels precisely in the same way as scientists like ROGER BACON in the thirteenth century.

And yet FREIND was not so gullible when he met with a medical quack. JOHN OF GADDESDEN, court physician and praised by CHAUCER as among the most celebrated medical writers of his day, was not spared by him. This physician, according to FREIND, appeared from his own writings sagacious enough to see through the foibles of human nature, knowing how far people could be

(27) FREIND does not say much about BACON's *De Erroribus Medicorum* except to speak of the book "wherein he [BACON] animadverts upon some errors of physicians." (p. 244 II).

imposed upon. After reciting a full list of quack methods and remedies used by this artful physician, FREIND added : "above all he understood the sweets of being concerned in the cases of pregnant women; he recommended toasted rhubarb. He knew very well there was a peculiar dialect to be used in these circumstances; and therefore we find him very waggish in these points and sometimes not only familiar but wanton not to say luscious (p. 289 II)".

The same anonymous author, incidentally, who attacked him for denouncing *nostrums* also criticized him for ridiculing " a worthy physician " (28). Is it to be inferred then that the practices of JOHN OF GADDESDEN were not altogether out of fashion in FREIND's time with many physicians?

When FREIND finally finished, however, denouncing quacks and recounting marvelous tales and cures, he had very little space left for recording the progress of medicine in the Renaissance. Thus his account of the progress in translations from the original Greek was limited to an account of the life of LINACRE and his fine translation of ARISTOTLE and GALEN; in anatomy the names of JACOBUS CARPUS, JACOBUS SYLVIUS and VESALIUS were mentioned without any detailed accounts of their achievements. But he did observe that "the anatomists of this age have done an injury to their old master GALEN" (p. 399 II). Although he recognized the importance of their work, he did not, apparently, approve of VESALIUS' dissent from GALEN's anatomy and physiology.

FREIND's history of medicine, then, is in many respects an improvement on its predecessors. First, close attention is paid to accurate chronology and to the original sources. Particularly in his account of the Byzantine period there is repeated evidence that he read the works of the authors he discussed. He did not rely on secondary accounts. Furthermore, more than the other historians, he saw the need of bringing his history up to date. But in this attempt his work was weakened by an over-emphasis of the early period and the reduction of the later period to almost a mere outline. This was precisely the fault he found with LE CLERC's work. Obviously, then, the weakness of this eighteenth

(28) C. W. *op. cit.*

century history of medicine can be explained in terms of the weakness of medicine itself in that century. In many respects we find that it had not yet emerged from the Middle Ages, particularly, as we have seen, with its reliance on GALEN and on Galenic compilers in the practice of medicine. If the grosser superstitions of the Middle Ages were abandoned, some still lingered on, as we have noted in the therapeutic use of precious stones and parts of animals. Furthermore, the progress made by a few was not appreciated or even known. LEONARDO DA VINCI's work in anatomy was still unknown to the eighteenth century world, and the critical approach to GALEN made by VESALIUS and others was still frowned upon. FREIND did not object if one differed from GALEN in some particular treatment, but an attack on GALEN's physiology and anatomy was regarded as an injury to the old master.

FREIND, then, may be considered a fair representative of the medical profession of his time. He accepted the new science, yet not completely enough to sever entirely the connection with Galenic medicine. He was, incidentally, quite popular among his colleagues in the London College of Physicians. All the Harveian orators praised him, and that, as GREENWOOD says, was not mere formal praise given to all college benefactors, since FREIND bequeathed nothing to the college. The real reason why FREIND was beloved was that he was a good practitioner, was not a quack, and did not depart too much from the traditions of his profession.

Brooklyn, New York PHILIP SHORR

Dr. FREIND's *Writings*

1. Letter to Dr. Sloan, on Hydrocephalus, *Philosophical Transactions* 1699.
2. A second letter to Dr. Sloan, De Spasmi Rarioris Historia, *Philosophical Transactions* 1703.
3. *Emmenologia*, London 1703 (according to introduction to fourth edition of History of Physick of 1750) Rotterdam and London 1711. T. DALE's English Translation, London 1729.
4. An account of the Earl of Peterborough's Conduct in Spain,

London, 1707. (FREIND was physician-general to the army for two years)

5. *Praelectiones Chymicae*, Amsterdam 1709-1710. English Translation, London, 1729 and 1735.
6. *Commentarii novem de Febribus* — London 1716. English Translation by THOMAS DALE — London 1730.
7. *De Purgantibus in secunda Variolarum confluentium febre adhibendis. Epistolae* — London 1719.
8. *Oratio Anniversaria* — habita ex Harvei Institute — London 1720.
9. *Ad Celeberrimum Virum Ricardum Mead De Quibusdam Variolarum Generibus.* London 1723.
10. *History of Physick* — 2 volumes — London 1725-1726. Latin Translation by JOHN WIGAN 1734.

FIG. 1.

PRÆLECTIONES CHYMICÆ,

In quibus omnes fere 1806

OPERATIONES

CHYMICÆ

AD VERA PRINCIPIA

Et ipsius Naturæ Leges rediguntur,

OXONII

HABITÆ.

A JOHANNE FREIND, M.D.
Æd. Christ. Alumn.

AMSTELODAMI,

Apud JANSSONIO-WAESBERGIOS.
MDCCX.

FIG. 2.

EMMENOLOGIA:

IN QUA

FLUXUS

MULIEBRIS

MENSTRUI

Phænomena, Periodi, Vitia cum Medendi Methodo, ad Rationes Mechanicas exiguntur.

AUTHORE

JOH. FREIND M. B.

Æd. Chriſti Alumn.

ROTERODAMI & LUGD. BAT.

Apud { JOANNEM HOFHOUT; & COENRADUM WISHOFF. } 1711.

FIG. 3.

PRÆFATIO.

MISERA profecto videtur & iniqua Fœminarum conditio, ut quæ Humani generis conſervatrices à natura deſtinatæ ſint, eadem morbis maxime obnoxiæ effingerentur. Quamcunque enim vitæ rationem ſequantur, paucæ ſunt, quibus contingit doloris expers & illibata ſanitas: quippe ſi conjugio fruantur, ex eo ipſo Leporum fonte amari aliquid ſurgit, & longa ſaltem tædia, ſi nihil aſperius, ſecum affert Graviditas; ſi cæli-

FIG. 4.

THE

HISTORY

OF

PHYSICK;

From the TIME of

GALEN,

To the Beginning of the

Sixteenth Century.

Chiefly with Regard to

PRACTICE.

In a DISCOURSE

Written to

Doctor *MEAD.*

By J. FREIND, M. D.

PART I.

Containing all the GREEK *Writers.*

London: Printed for *J. Walthoe*, jun. over against the *Royal-Exchange* in *Cornhill*, 1725.

FIG. 5.

TO THE

READER.

THE following Papers were, for the greateſt Part, writ, juſt as they now appear, ſome time ago; only to paſs away a few leiſure hours, and without any deſign of making them publick.

I have ſince been perſuaded to review them, and have made ſome Additions here and there, as I found occaſion. The Reader will eaſily imagine, that I have been obliged to conſult more Books than I had in thoſe circumſtances an opportunity to peruſe; and ſome I have refer'd to, which have been publiſhed ſince the firſt com-

FIG. 6.

Charles Fremont
Historien de la technologie
(1855-1930)

LOUIS-CHARLES FREMONT est né le 7 août 1855, probablement à Paris car il appartenait à une famille d'artisans parisiens. Son grand-père, LOUIS-CHARLES FREMONT (1795-1858) était un serrurier dont les affaires furent continuées par deux fils JEAN-BAPTISTE FREMONT (1822-76) et JEAN-FRANÇOIS FREMONT (1827-1902). Lui-même représentait donc la troisième génération d'artisans et il en était justement fier. Il fréquenta l'Ecole Turgot et s'y distingua mais fut obligé de la quitter prématurément par suite des difficultés qui assaillirent ses parents.

Après un essai d'entreprise commerciale, il monta un atelier de constructions mécaniques qu'il dut aussi abandonner; puis il commença des études médicales et s'appliqua en même temps à l'art photographique. Un nouvel essai commercial, l'organisation d'un laboratoire pour l'essai des matériaux, ne fut pas plus heureux que les précédents mais entretemps son expérience technique grandissait sans cesse. Dès la création d'un laboratoire de mécanique à l'École supérieure des Mines, en 1902, celui-ci lui fut confié. Dès lors sa vie fut organisée pour toujours. Son travail professionnel au laboratoire lui laissait le temps de faire des recherches originales et il sut en profiter. Il fut aussi attaché au Conservatoire des Arts et Métiers, et eut plusieurs fois l'occasion de travailler aux ateliers de la Compagnie des Omnibus de Paris (à Clignancourt). Il mourut le 17 août 1930.

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La majeure partie de son activité était consacrée à des essais purements techniques sur les méthodes d'essai des matériaux, les machines outils et des questions connexes telles que la fragilité

des métaux. Je ne puis insister ici sur ces travaux. On en trouvera une analyse sommaire dans la notice de M. EDOUARD SAUVAGE, parue dans le *Bulletin de la Société d'encouragement pour l'industrie nationale* de juin 1931 (1). Je me bornerai ici à en reproduire les conclusions :

"Une œuvre pareille" nous dit M. SAUVAGE "ne s'explique que par un idéal constamment poursuivi avec une foi ardente. FREMONT ne pouvait admettre que les ruptures de pièces métalliques, trop souvent causes d'accidents mortels, fussent une nécessité inéluctable, à laquelle on devait se résigner; il a constamment recherché les causes réelles de ces ruptures et les moyens de les prévenir. D'une part, il a étudié les défauts divers que peuvent présenter les métaux, défauts souvent peu visibles mais devenant causes de graves altérations en service, puis les moyens de les éviter dans la production du métal et dans l'élaboration des pièces métalliques; d'autre part, il a préconisé les méthodes d'essai permettant de contrôler le plus sûrement la qualité des métaux, en choisissant de préférence celles d'exécution facile, qu'on peut multiplier. Toutes ses recherches ont été conduites avec une rigueur scientifique en vue des applications pratiques. Outre les défauts des matériaux employés, la mise en œuvre de ces matériaux est parfois défectueuse : aussi FREMONT a-t-il étudié les procédés d'exécution et, tout particulièrement, le poinçonnage et le rivetage; il a donné des règles fort utiles pour la bonne exécution de ces opérations. Observateur des plus habiles, ayant acquis une grande expérience, grâce au nombre de pièces avariées qui lui ont été soumises, FREMONT était parfaitement préparé pour sa tâche humanitaire. On ne saurait trop louer la générosité dont a fait preuve FREMONT dans cette lutte contre les accidents dus aux défauts des métaux et aux négligences dans leur mise en œuvre. Ses travaux ne sont pas restés stériles : déjà ses méthodes sont d'une application fréquente, et il est bien vraisemblable qu'elles seront de plus en plus employées, tant en France qu'à l'étranger. Le nom de FREMONT doit être honoré comme celui d'un de nos illustres techniciens et d'un bienfaiteur de l'humanité."

Un autre témoignage nous est donné par l'ensemble des récompenses qui lui ont été décernées : la Société d'Encouragement lui a donné maintes subventions, l'Académie des sciences plus de vingt prix, la Société des Ingénieurs civils de France, deux grandes médailles d'or, et l'Iron and Steel Institute la médaille Bessemer. La République l'avait fait chevalier de la Légion d'honneur.

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Pendant que se poursuivaient sans relâche ses études expérimentales, FREMONT s'était constitué petit à petit une riche bibliothèque

(1) Voir aussi l'article publié dans le journal *L'usine*, du 19 décembre 1930, que je n'ai pas moi-même entre les mains.

d'ouvrages techniques anciens et s'était intéressé de plus en plus à l'étude des origines et du développement des arts et métiers. Il s'en suit que la longue série de mémoires que nous lui devons et qu'il intitulait " Études expérimentales de technologie industrielle " (86 numéros) contiennent des données historiques dont la collection est fort utile. J'en donne ci-dessous la liste. Certains d'entre eux sont de vraies monographies historiques, dans d'autres les données anciennes sont rares ou absentes.

Il est à remarquer que la documentation de FREMONT en dehors des livres anciens était presque exclusivement française. Je ne me souviens pas de l'avoir vu citer des sources allemandes ou anglaises, mais je puis me tromper. Il en résulte que ces études sont probablement incomplètes. Cependant elles sont précieuses, d'abord parce que FREMONT avait fort bien exploité les sources dont il disposait, mais surtout parce que sa vaste expérience technique et son génie d'inventeur lui permettaient d'interpréter les documents et les monuments anciens avec beaucoup plus d'intelligence que les historiens de cabinet, avec un sens plus profond des réalités techniques. J'ai souvent insisté sur ce fait que les meilleurs fruits de l'histoire des sciences sont réservés pour les historiens qui peuvent s'appuyer non seulement sur des textes mais aussi sur des expériences, des expériences nombreuses et réelles, non pas les expériences plus au moins artificielles de l'enseignement, mais celles plus complexes que la pratique quotidienne les oblige à instituer. Or si cela est vrai pour l'histoire des sciences, c'est encore beaucoup plus vrai naturellement pour l'histoire des arts et métiers.

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CHARLES FREMONT consacra toute sa vie à la science. En dehors de son laboratoire et de son bureau où il passait toutes ses journées, sa vie gravitait autour de sa mère et de sa sœur qui étaient les gardiennes de son foyer. Sa mère mourut quelques années avant lui, mais sa sœur lui a survécu. Elle a donné à la Société d'encouragement la bibliothèque historique de son frère, non seulement les livres mais beaucoup d'autres documents et clichés qu'il avait lentement accumulés. Mlle FREMONT a aussi créé une fondation pour venir en aide aux techniciens au début de leur carrière

et elle a fondé à l'hôpital Saint-Joseph un lit réservé aux ingénieurs et aux mécaniciens dans le besoin.

Le style de FREMONT est aussi clair mais aussi sévère que possible. Ses mémoires sont comme des outils de travail sans aucun ornement. Il ne s'y livre pas du tout, sauf que certains d'entre eux sont dédiés à d'anciens maîtres et amis à qui il voulait témoigner sa reconnaissance. Parmi les mémoires que je possède j'ai trouvé ainsi des dédicaces à l'ingénieur FLORIS OSMOND, à l'anatomiste MATHIAS DUVAL, à ISIDORE DESNOYERS, à CHARLES BERNOT, à EDOUARD SAUVAGE, à PASTEUR, à JULES MAREY. Un autre fascicule (no. 70, 1924) est dédié à sa mère et sa sœur bien aimées, et contient leur portrait ainsi que celui des trois générations de serruriers parisiens, les FREMONT (dont j'ai parlé au début de cet article)—les quatre FREMONT, le grand-père, le père, l'oncle, et l'auteur lui-même. Bien mieux, ce même fascicule en plus des six FREMONT qui figurent en frontispice, nous donne *in fine* le portrait d'un beau chien, qui ne peut être que le chien de la famille, sinon sa présence là serait tout à fait injustifiée ! Un autre portrait de FREMONT figure aussi, mais sans aucune indication, sur la couverture du mémoire no. 82 (*La lime*, 2e édition) paru en 1930, et peut-être posthume.

Dans le groupe d'ailleurs fort disparate des historiens de la science, CHARLES FREMONT représente un type fort spécial et fort rare, celui de l'artisan lettré tel qu'il y en a eu davantage au XVIIIe siècle — méchaniciens et inventeurs qui lisaient l'*Encyclopédie* et qui parfois y contribuaient ou aidaient DIDEROT à le faire. En l'appelant " artisan " je ne veux pas du tout le dénigrer, bien au contraire, et je sais que son éducation était assez vaste et qu'elle dépassait de beaucoup son domaine technique. D'autre part — pour autant que je sache, car je ne l'ai jamais vu et n'ai jamais reçu un mot de lui — c'était aussi un type — assez commun celui-là — de provincial de Paris, de l'homme de science qui oscille entre son laboratoire et son foyer, et se soucie assez peu du reste du monde. FREMONT est un de ces grands isolés à qui l'humanité doit tant, les artisans silencieux et bienfaisants grâce à qui notre vie devient meilleure — ou tout au moins peut le devenir.

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Liste des mémoires technologiques de CHARLES FREMONT

Toutes ces publications sont d'assez grand format (grands in quarto). Les numéros précédés d'un astérisque sont ceux que je possède; ce sont aussi, je pense, les plus importants pour les historiens des sciences. J'ai pu examiner quelques uns des autres à Par en Cornouailles chez mon ami CHARLES SINGER, à qui je dois de connaître l'œuvre de FREMONT. Il m'a paru utile de publier la liste complète telle que FREMONT lui-même l'a établie (et avec son propre numérotage commençant avec zéro). J'ai ajouté ci et là quelques remarques.

0. Technologie du forgeron (1890 et 1891).
1. Épuration et stérilisation de l'eau (1895).
2. Les mouvements de l'ouvrier dans le travail professionnel (1895).
3. Mémoire sur le poinçonnage et le cisaillement des métaux (*Bulletin de la Société des ingénieurs civils de France*, janvier 1896).
4. Les lignes de LÜDERS (*Bulletin de la Société d'encouragement*, septembre 1896).
5. Étude expérimentale du cisaillement et du poinçonnage des métaux (*ibid.*, septembre 1897).
6. Étude de chaudronnerie (*Bulletin de la Société des ingénieurs civils de France*, novembre 1897).
7. Études sur les avaries de certaines chaudières dans la région des rivures circulaires (*Bulletin de la Société d'encouragement*, mai 1898).
8. Appareils nouveaux pour l'essai des métaux employés dans les travaux publics (*Bulletin de la Société des ingénieurs civils de France*, décembre 1898).
9. Étude sur la production des machines-outils façonnant les métaux. En collaboration avec M. HUILLIER (*Bulletin de la Société d'encouragement*, avril 1899).
*10. Évolution des méthodes et des appareils employés pour l'essai des matériaux de construction (d'après les documents du temps) (*Congrès international des méthodes d'essai des matériaux de construction*, tenu à Paris du 9 au 16 juillet 1900). 104 p., 166 fig., 1900.

Histoire de l'étude de la résistance des matériaux depuis GALILÉE jusqu'à 1900, contenant une riche collection de portraits, facsimiles et autres illustrations.

11. Lignes superficielles apparaissant dans le sciage des métaux (*Bulletin de la Société d'encouragement*, novembre 1900).
12. Étude expérimentale des causes de la fragilité de l'acier (*ibid.*, février 1901).
13. Étude expérimentale sur le pliage des barrettes entaillées. En collaboration avec F. OSMOND (*Bulletin de la Société d'encouragement*, avril 1901).
14. Essai des métaux par pliage de barrettes entaillées (*ibid.*, septembre 1901).
14*bis*. Essai des métaux par pliage de barrettes entaillées (*Congrès des méthodes d'essai des matériaux*, Budapest, 1901).
*15. *Évolution de la fonderie de cuivre d'après les documents du temps*. Ouvrage publié sous la direction de A. MULLER et P. ROGER. IV+360+XX p., 348 fig., Paris, RENOUARD, 1903.

Préface : "Suivre le plus exactement possible l'évolution de la fonderie de cuivre, depuis les temps anciens jusqu'à nos jours, montrer simplement, sans aucune prétention scientifique, les différents moyens, les divers procédés employés par les maîtres fondeurs des siècles passés, faire voir les transformations, les modifications successives qui se sont faites dans la manière d'opérer, et établir quelles sont aujourd'hui les méthodes les plus usitées et par suite les progrès accomplis, tel est en quelques mots le but de cet ouvrage. Nous avions pensé d'abord étudier spécialement la fonderie de cuivre et nous borner à en indiquer les phases diverses. Mais, au cours de nos recherches, nous avons constaté que le fondeur en bronze était, dans les siècles passés, tout à la fois mineur, métallurgiste et fondeur de première fusion. De ce fait, il nous a fallu étendre notre sujet, agrandir un peu notre cadre, et c'est ainsi que nous avons été conduits à parler de toutes les opérations métallurgiques. Nous nous sommes attachés surtout dans ce volume, à faire passer rapidement sous les yeux du lecteur, au moyen de nombreuses figures, les différents procédés des anciens, sans entrer dans des descriptions détaillées, et en nous bornant à compléter par quelques mots de texte, par quelques explications succinctes, les dessins qui, à eux seuls, suffisent presque à donner une idée générale des transformations successives qui se sont opérées dans l'industrie du fondeur de métaux. Nous indiquons d'ailleurs à chaque page les sources où nous avons puisé nos renseignements, afin de donner à ceux que la question intéresse, la facilité de se reporter à l'ouvrage pour avoir de plus amples détails."

15*bis*. Nouvelle méthode d'essai des rails (*Comptes rendus de l'Académie des sciences*, 5 janvier 1903).
16. Mesure de la limite élastique des métaux (*Bulletin de la Société d'encouragement*, septembre 1903).
17. Les méthodes de déformation et de rupture des fers et aciers doux. En collaboration avec F. OSMOND et G. CARTAUD (*Revue de métallurgie*, janvier 1904).

18. Conclusions de la précédente note. En collaboration avec F. OSMOND (*Revue de métallurgie*, avril 1904).
19. Mesure de la pression maximum instantanée résultant d'un choc (*Revue de métallurgie*, juin 1904).
19*bis*. Le poinçonnage envisagé comme méthode d'essai. En collaboration avec M. BACLE (*Bulletin de la Société d'encouragement*, novembre 1904).
20. Explosion d'une chaudière de locomotive (*Bulletin de la Société d'encouragement*, mars 1905).
21. Les sillons de corrosion dans les tôles de chaudières à vapeur. En collaboration avec M. OSMOND (*Revue de métallurgie*, octobre 1905).
22. Explosion d'une locomotive (*Le génie civil*, novembre 1905).
23. Les propriétés du fer en cristaux isolés. En collaboration avec M. OSMOND (*Revue de métallurgie*, novembre 1905).
24. Résistance au cisaillement des aciers de construction (*Revue de métallurgie*, mai 1906).
25. *Étude expérimentale du rivetage*. Mémoire publié par la Société d'encouragement, 1906.
26. *Les outils préhistoriques, leur évolution* (Paris, DUNOD et PINET, 1907).

Je n'ai pas vu ce travail.

*27. Origine du laminoir. Note présentée à l'Académie des sciences, le 21 avril 1908. *Revue de métallurgie* 5, 505-08, 5 fig., 1908.

« En résumé, le laminoir constitué par deux cylindres parallèles et *entraîneurs* du métal à laminer dérive de la filière en deux pièces du tréfileur, la filière dérive de l'aiguille à coudre et l'aiguille à coudre du poinçon en esquille d'os ».

28. Essai des fers et des aciers par corrosion (*Revue de métallurgie*, octobre 1908).
29. Recherches sur les causes de l'explosion d'une bouteille d'hydrogène comprimé. En collaboration avec J. DANLOS (*Le génie civil*, 10 avril 1909).
30. De la résistance des pièces rivées (*Bulletin de la Société d'encouragement*, avril 1909).
31. Essais mécaniques de la fonte (*Bulletin de la Société d'encouragement*, mais 1909).

32. Le coup de pointeau central. En collaboration avec F. DE VILLENOISY (*Gazette numismatique française*, juin 1909).
33. Étude expérimentale de la résistance vive à la traction des attelages de wagons (*Bulletin de la Société d'encouragement*, novembre 1909).
*34. Le carré creux des monnaies grecques. Évolution des procédés de fabrication. En collaboration avec F. DE VILLENOISY. (*Revue numismatique*, 11 p., 3 pl., décembre 1909).
35. L'analyse des aciers à l'aide des étincelles. En collaboration avec M. POURCEL (*Revue de métallurgie*, février 1910).
36. Étude expérimentale sur la résistance des soudures (*Le génie civil*, 26 février 1910).
*37. Machine à mesurer le rendement des vis. Origines de la vis et des engrenages. (École nationale supérieure des mines de Paris). *Revue de mécanique* 28 p., 28 fig., 1910.

La partie historique s'étend de la p. 14 à 28, et comporte 17 figures.

38. La fatigue des métaux et les nouvelles méthodes d'essai (*Le génie civil*, 22-29 octobre et 19 et 26 novembre 1910).
39. Nouvelle méthode d'essai des rails (*Le génie civil*, 6-13-20 et 27 mai 1911).
*40. Le clou. *Bulletin de la Société d'encouragement* 143 p., 257 fig., 1912.
41. La cause du naufrage du Titanic (*La technique moderne*, 1 juillet 1912).
42. Six notes relatives à des méthodes d'essai des métaux (*Congrès des méthodes d'essai des matériaux*. New York 1912).
43. Distribution des déformations dans les métaux soumis à des efforts. Cas du plissement des tuyaux (*La technique moderne*, 1 juin 1913).
*44. *Origine et évolution des outils.* Mémoires publié par la Société d'encouragement. 157 p., 322 fig. Paris, 1913.
*45. *Origine et évolution des outils préhistoriques.* 41 p., 63 fig. Paris 1913.
46. A propos du système TAYLOR (*La technique moderne*, 1 novembre 1913).
*47. *Origine de l'horloge à poids.* 28 p., 34 fig. Paris 1915.
*48. *Le balancier à vis pour estampage.* 36 p., 46 fig. Paris 1916.

49. *La lime*, 1916.

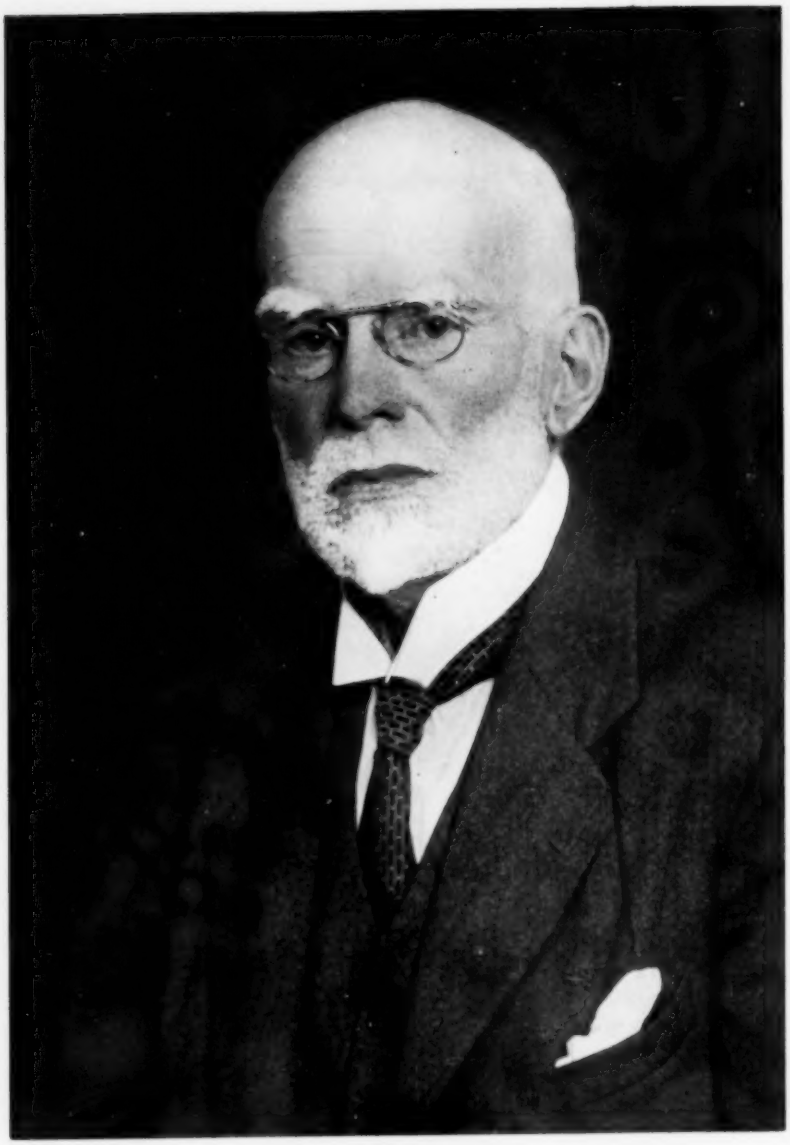
Je n'ai pas vu ce mémoire mais j'ai la deuxième édition, datée de 1930, voir nº 82. Il a été traduit en anglais sous le titre *Files and filing*, sous la direction de GEORGE TAYLOR de la firme "TAYLOR file and tool company" de Leeds (xii + 148 p., London, PITMAN, 1920).

*50. *Origine et évolution de la soufflerie*. 98 p., 162 fig., Paris, 1917.
51. *Les lois de* WOHLER. Paris 1919.
52. *Critique des expériences de* G. CHARPY *sur le corroyage de l'acier*. Paris 1919.
53. *Nouvelles méthodes d'essais mécaniques de la fonte*. Paris 1920.
*54. *Origine et évolution du tuyau*. 25 p., 30 fig. Paris 1920.
55. *Causes des ruptures d'attelages*. Paris 1921.
56. Essai, à l'emboutissage, des tôles minces (*Bulletin de la Société d'encouragement*, mars 1921).
*57. Origine de la poulie, du treuil, de l'engrenage, de la roue de voiture, etc. Étude sur le frottement des cordes et sur les palans. (*Bulletin de la Société d'encouragement* 133, 329-72, 62 fig.; 433-62, 14 fig., 1921).
58. *Causes d'usure prématurée des rails*. Paris 1921.
59. *Essai de réception des rails*. Paris 1921.
60. *Essai mécanique des fils d'acier*. Paris 1921.
61. *Causes des ruptures accidentelles des rails*. Paris 1922.
62. *Unification des méthodes d'essai des métaux*. Paris 1922.
63. *A propos de l'anniversaire de l'accident du chemin de fer de Versailles*. Paris 1922.
64. *Le marteau, le choc, le marteau pneumatique*. Paris 1923.
65. *Essai mécanique des tubes d'acier*. Paris 1923.
*66. *La forge-maréchale*. 101 p., 232 fig. Paris 1923.
*67. *Origine et début de l'évolution de la chaudière à vapeur*. 15 p., 34 fig. Paris, 1923.
*68. *Origine et évolution des pompes centrifuges*. 7 p., 16 fig. Paris 1923.
69. *Usure et défauts des rails*. Paris 1924.
*70. *La serrure. Origine et évolution*. 51 p., 120 fig. Paris 1924.
71. *Essai de corrosion des fers et des aciers*, 1927.
72. *Étude de l'essai de traction des métaux*, 1927.
73. *Une des causes de rupture des ressorts d'horlogerie*, 1928.
74. *Essais de réception des aciers pour constructions métalliques*, 1928.

*75. *La vis*, 61 p., 96 fig. Paris, 1928.
*76. *Les outils, leur origine, leur évolution*, 130 p., 278 fig. 1928.
*77. La scie (*Bull. de la Société d'encouragement*, 643-721, 142 fig. Paris, 1928).
78. La formation des apprentis (*Bulletin de la Société d'encouragement*, décembre 1928).
79. A propos de normalisation (*L'usine*, 11 janvier 1929).
80. Le banc d'orfèvre du musée de Cluny (*Bulletin de la Société d'encouragement*, janvier 1929).
81. *Le cisaillement et le poinçonnage des métaux*, 1929.
*82. La lime, 2e édition (*Bulletin de la Société d'encouragement*, 176 p., 306 fig., Paris 1930).

Rien n'indique en quoi cette édition diffère, si elle en diffère, de la première. Elle est précédée du rapport de la Société d'encouragement de 1914.

Cambridge, Mass. G. SARTON.



J. K. Fotheringham

John Knight Fotheringham (1874-1936)

It would be quite against FOTHERINGHAM's way to write a biography of him, uncritically or in an exaggerated note. But as I feel he was a rare man, what I shall write expresses my own personal views. The notice of him in *Who's Who* is :

"M. A., D. Litt. [Oxon.]; Reader in Ancient Astronomy and Chronology in the University of Oxford, and Honorary Assistant in the University Observatory, Oxford, since 1925; *b.* 1874; *s.* of late David Fotheringham, Presbyterian minister, of Tottenham; *m.* 1903, Mary Eleanor, *d.* of late Joseph Atkinson of Crosby Garrett, Westmorland. *Educ.* : City of London School; Merton College, Oxford (Exhibitioner). 2nd class Classical Mods., 1894; 1st class Lit. Hum., 1896; 1st class Mod. Hist., 1897; Senior Demy of Magdalen College, 1898-1902. Student of British School at Athens, 1899; Lecturer in Classical Literature, King's College, London, 1904-9. Lecturer in Ancient History, King's Coll., London, 1909-12. Fellow of Magdalen Coll., 1909-16; Johnson Prize, 1911; Reader in Ancient History in the Univ. of London 1912-20; Assistant in University Observatory, Oxford, 1918-25; Halley Lecturer, University of Oxford, 1921; Presbyterian.

Publications : The Bodleian Manuscript of the Chronicle of Eusebius, 1905; Longman's Political History of England, vol. xi (with the late Hon. G. C. Brodrick), 1906; Marco Sanudo (with L. F. R. Williams), 1915; Historical Eclipses, 1921; Eusebius, Chronici Canones, 1923; The Venus Tablets of Ammizaduga (with S. Langdon and C. Schoch), 1928."

Leaving the personal matters aside,— which are recorded above as he stated them himself, — FOTHERINGHAM's introduction to astronomy was in his 43rd year; it was due to the late Prof. H. H. TURNER, F.R.S., who had a very high opinion of his competence, and made him, first an assistant and then an honorary assistant, at the University Observatory at Oxford. Before that, he had been devoted to classics, through ancient chronology had always an attraction for him.

Though he entered astronomy so late, he became at once an authority on a difficult branch of it, and without going beyond his chosen subject of ancient chronology, he seemed to add what he had learnt without any effort.

To mention first what I cannot agree with, that the Chaldean astronomers KIDINNU and NABORIANNU anticipated HIPPARCHUS, and are responsible for the discovery of the Precession of the Equinoxes : — they certainly had before them an almost unbelievable sequence of observations; but as FOTHERINGHAM found out later, when he edited along with LANGDON and SCHOCH, the Venus tables, they were interested chiefly or exclusively in the supposed astrological bearing of the observations, and were quite deficient in the geometrical analysis which was a commonplace to the Greek mind. Used as we are now to geometrical analysis, it is difficult to think oneself without it. But FOTHERINGHAM's own experience might have directed his mind otherwise; as he wrote in a letter to me, "DALE... revealed to me the meaning of the symbols in HANSEN's... work on the Moon." To a mathematician it is hard to imagine that they require any explanation.

Some particulars are given in *The Observatory*, vol. 51 (1928), p. 312, to show the accuracy of KIDINNU, most of them being right to two or three seconds. I read these with the greatest doubt. They would show that the eccentricity of the Sun's orbit was clearly appreciated in B.C. 375. Seconds may be deduced from long series of observations, but nobody could measure seconds correctly until after the advent of the telescope.

The professor of Assyriology at Oxford had a very high opinion of FOTHERINGHAM. FOTHERINGHAM had no training in Assyriology, yet his instinct and imagination seemed to keep him right. He devoted a great deal of time to old eclipses, which, provided they are properly recorded, — which none that I know are, — furnish one of the most definite data for chronology. Astronomers will always be divided into a consenting class and a doubting class. NEWCOMB may be claimed as belonging to the latter. SCHIAPARELLI, — quite as competent a man, — belongs to the former. It was SCHIAPARELLI's active imagination that persuaded him he could interpret the doubtful phrases of the old descriptions. NEWCOMB, on the other hand, said that the rule was, where an eclipse was described in any state, to assume it was central at the head town

of that state. Thus, even among the scientific Greeks, AGATHOCLES, sailing out from Syracuse, certainly experienced an eclipse of the Sun, but it was not stated whether he sailed north or south to his destination, which is a vital point. There seems a complete want of interest in what we now know can only be shown by eclipses. As to FOTHERINGHAM's position, his doubts were concerning bad work, to which he was unmerciful. Where he found work he agreed to, he gladly assented. He appreciated good work. He was himself a very truthful man. In sum, he was a don of the old type; he has left little behind him, though an active man; he was more concerned with being sure that he knew accurately than with publishing some sensational discovery.

He was very happy in his personal relations, — which he owes to his own nature, — and with his wife, who survives him; his one recreation was going long walks.

Edinburgh. R. A. SAMPSON.

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1904

Letter of application and testimonials in favour of JOHN KNIGHT FOTHERINGHAM...candidate for the office of lecturer in Latin in the Bedford college for women, London (Oxford 1904?). 7 leaves.

1905

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1906

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close of WILLIAM IV's reign (1801-37) by the Hon. GEORGE CHARLES BRODRICK (1831-1903) completed and revised by J. K. FOTHERINGHAM. xix+486 p., 3 maps. London, LONGMANS, 1906. (The political history of England edited by WILLIAM HUNT and REGINALD L. POOLE, vol. XI).

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1908

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Historical data for the secular acceleration of the moon. *M. N.* 69, 26-30.

The star of Bethlehem. *Journ. theol. studies* 10, 116-19, 1908.

1909

The eclipse of HIPPARCHUS. *M. N.* 69, 204-10, 2 figs.

Note on the regnal years in the Elephantine papyri. *M. N.* 69, 446-48.

Note on Professor NEWCOMB's paper on "Comparison of the ancient eclipses of the sun with modern elements of the moon's motion". *M. N.* 69, 467-69.

On the accuracy of the Alexandrian and Rhodian eclipse magnitudes. *M. N.* 69, 666-68.

Note on Mr. NEVILL's discussion of the long-period terms in the moon's longitude. *M. N.* 69, 669-73.

1910

Genoa and the Fourth Crusade. *English historical review* 25 26-57.

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1911

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1913

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1915

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1919

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Ancient observations of coloured stars. *Observatory* 43, 191-92. (*Isis* 4, 132).

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1921

Historical eclipses, being the Halley lecture delivered May 17, 1921. 32 p. Oxford, Clarendon Press.

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The Easter calendar and the Slavonic Enoch. *Journ. theol. studies* 23, 49-56.

1923

The secular acceleration of the moon's mean motion as determined from occultations and conjunctions in the "Almagest" (a correction). *M. N.* 83, 370-73. (*Isis* 14, 466).

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1924

The Metonic and Callippic cycles. *M. N.* 84, 383-92.

1925

Visibility of stars in Great Britain during the solar eclipse of 1925 January 24. *M. N.* 85, 509-10.

Naked-eye observations of Venus. *M. N.* 85, 894.

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1926

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For a discussion of this work and of FOTHERINGHAM's collaboration with SCHOCH, see A. POGO : CARL SCHOCH (1873-1929). *Isis* 15, 163-69, 1931.

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Astronomical chronology. *Observatory* 52, 305-08.

The calendar. *Nautical Almanac for the year* 1931, 734-37, London 1929; reprinted in the issues for the years 1932-34; revised in the issues for the years 1935 and following.

1930

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The Radcliffe Observatory. *Journ. Brit. Astr. Assoc.* 41, 40-42.

E. B. KNOBEL. *Nature* 126, 249.

C. SCHOCH. *Observatory* 53, 83-85.

Notes on galactic rotation. *M. N.* 90, 749-53.

The recorded date of the Chinese eclipse of — 719. *M. N.* 90, 797-98.

1931

Note on the motion of the perihelion of Mercury. *M. N.* 91, 1001-04.

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1932

The determination of the accelerations and fluctuations in the motions of the sun and moon. *Observatory* 55, 305-16.

Translation of an inscription on a prism from Nineveh. *Observatory* 55, 338-40.

1933

The story of HI and HO. *Journ. Brit. Astr. Assoc.* 43, 248-57.

Greenwich personality and the equinox correction. *M. N.* 93, 530-35, 1 fig.

1935

Two Babylonian eclipses. *M. N.* 95, 719-23 (*Isis*, 25, 559).

The mass of Venus and the obliquity of the ecliptic. *Astr. Nachrichten* 256, 1-18.

1936

The R-D difference. *Observatory* 59, 313.

The sociology of knowledge (*)

The last two decades have witnessed, especially in Germany and France, the rise of a new discipline, the sociology of knowledge (Wissenssoziologie), with a rapidly increasing number of students and a growing literature — (even a "selected bibliography" would include several hundred titles). Since most of the investigations in this field have been concerned with the socio-cultural factors influencing the development of beliefs and opinion rather than of positive knowledge, the term "Wissen" must be interpreted very broadly indeed, as referring to social ideas and thought generally, and not to the physical sciences, except where expressly indicated. Briefly stated, the sociology of knowledge is primarily concerned with the "dependence of knowledge upon social position" (1) and, to an excessive and fruitless degree, with the epistemological implications of such dependence. In fact, as we shall see, there is a growing tendency to repudiate this latter problem as it becomes increasingly apparent that the social genesis of thought has no necessary bearing on its validity or falsity.

The *Seinsverbundenheit* of thought is held to be demonstrated when it can be shown that in certain realms knowledge does not develop according to immanent laws of growth (based on obser-

(*) This brief general survey of the subject is primarily but not exclusively based upon the following books :

Ernst Grünwald. *Das Problem der Soziologie des Wissens.* Wien-Leipzig : Wilhelm Braumüller, 1934. Pp. 279+viii. RM 7.50.

Max Scheler (ed.). *Versuche zu einer Soziologie des Wissens.* München und Leipzig : Duncker & Humblot, 1924. Pp. 450+vii.

Alexander von Schelting. *Max Webers Wissenschaftslehre.* Tübingen : J. C. B. Mohr, 1934. Pp. 420+viii. RM 16.

Karl Mannheim. *Ideology and utopia : an introduction to the sociology of knowledge.* Translated by Louis Wirth and Edward Shils. New York : Harcourt, Brace and Company; London : Kegan Paul, Trench, Trubner & Co., 1936. Pp. 318+xxxi. $4.00. 15s.

(1) „Seinsverbundenheit des Wissens", a phrase which is fast becoming a ready cliché

vation and logic) but that, at certain junctures, extra-theoretical factors of various sorts, usually termed *Seinsfaktoren*, determine the appearance, form, and in some instances, even the content and logical structure of this knowledge. These non-theoretical factors may impinge upon thought in several ways : by leading to the perception of the problem, by determining its theoretical formulation, by fixing the assumptions and values which to a considerable degree affect the choice of materials and problems, and by being involved in the process of verification.

These factors manifestly influence thought in certain spheres (e.g. the social sciences and the field of opinion generally) to a far greater extent than others (e.g., the physical and natural sciences). Hence it is quite understandable that most students of *Wissenssoziologie* have neglected the analysis of the development of the more firmly established disciplines.

It is manifest that the sociology of knowledge is concerned with problems which have had a long prehistory. So far is this true, that this discipline has already found its first historian, ERNST GRÜNWALD. As he properly indicates, some of its dominant conceptions are simply more systematic and more clearly formulated restatements of views which found expression in the writings of FRANCIS BACON (see his discussion of the Idola), to trace them no further back. In this same tradition, marking the intellectual optimism of the Enlightenment, inasmuch as it assumed that man is capable of acquiring valid knowledge concerning all problems but does not do so merely because of 'disturbing factors', is VOLTAIRE's doctrine of the "priestly lie." From this view that man, who *can* know the truth, is lead to conscious dissimulation by his interests (economic, the will to power, etc.), it is not a far cry to the doctrine that ideas are the outcome of profound interests which unwittingly tincture and distort every phase of man's thought. NIETZSCHE starts out from this basis but adds a new facet : the fact that a judgment is false does not necessarily preclude its utility. This distinction between truth and utility finds further expression in the works of VAIHINGER, SOREL, PARETO and G. ADLER.

According to GRÜNWALD, the Christian dogma of evil, which is *error* in the cognitive sphere, as a necessary element of the inscrutable Divine Plan, is the second principal historical root

of the sociology of knowledge. Certain groups, notably those of unbelievers, were stricken with blindness by God, so that their judgments *cannot* be valid. Hence, it is no longer necessary to analyze their individual judgments in order to ascertain their falsity; this is pre-determined by their group-affiliation. In the hands of HEGEL, this doctrine becomes secularized, and necessarily fallacious thought, up to a certain point, is held to be a reflection of the absolute Geist, since such thought is nothing but a means for the "List der Vernunft" to gain its own ends. This idealistic historicism guarantees its own truth by holding that the philosopher, HEGEL himself, stands in alliance with the world-spirit; he is no longer simply a tool in the hands of the absolute spirit, but is at last able to comprehend it. MARX substitutes the "relations of production" for HEGEL's absolute spirit : the determinant of an individual's thought and attitudes is found in his position in the productive process. Just as some classes are *unavoidably* characterized by unavoidably distorted viewpoints *(falsches Bewusstsein)* — hence the motives of their members need not be impugned — so the class which is the exponent of an immanent historic process, namely the proletariat, is assured the possibility, if indeed not the certainty, of valid thought.

The circular reasoning of these doctrines is apparent. Assuming premises which involve a radical historicism entailing the denial of the possibility of valid thought, they uniformly seek to vindicate their own contentions by mere fiat : by asserting that the historical process (transcendentally or immanently determined) is such as to exempt the writer, or the group with which he is affiliated, from error.

In contrast to these views, MAX SCHELER does not accord any one social class a monopoly of truth. In an aphoristic fashion which did not permit him to develop his many insights, he suggests that the *Realfaktoren* (race, state, economy) act as selective agencies of ideas, retarding or quickening their diffusion, but not affecting their validity or determining their content. This view does not initially preclude an analysis of the development of the physical and natural sciences since it is primarily concerned with the study of non-theoretic factors in so far as they determine the direction of intellectual interest. An extreme historicism, on the other hand, precisely because it unwarrantably maintains that the

conditioning of thought by socio-cultural factors has a significant bearing on its validity, is compelled to eliminate these sciences from consideration, on pain of being forced into the uncomfortable position of repudiating the accumulated bulk of scientific knowledge.

SCHELER suggests that an important social development which lay behind the upsurge of modern science was the increasing division between Church and State in the late Middle Ages, and the subsequent multiplication of religious sects. This meant an ever greater guarantee of the freedom of science since scientists could play the many authorities against one another with the result that authoritarian restrictions on science became ever less binding. "Toleration" is not unrelated to a multiplicity of conflicting sectarian points of view. Moreover, in contrast to the feudal ruling classes which consistently sought control over *men*, the new bourgeoisie were primarily concerned with acquiring the capacity and power to reshape *things* into valuable goods. This change was equally manifested by a suppression of the 'magical' techniques of controlling groups and of the traditional ruling classes and by a new positive estimation of the possibility of controlling nature.

„Nicht der technische Bedarf bedingt die neue Wissenschaft, nicht die neue Wissenschaft den technischen Fortschritt, sondern im Typus des bürgerlichen neuen Menschentums und seiner neuen Triebstruktur und seinem neuen Ethos ist ebensowohl fundiert die ursprüngliche Umformung des logischen Kategorialsystems der neuen Wissenschaft als der neue gleich ursprüngliche technische Antrieb auf Naturbeherrschung." (p. 100)

SCHELER suggests further that parliamentary democracy (or regimes approximating it in structure) has been connected with science in the liberal era through a number of common presuppositions and demands. First among these is the general belief, embodied in strong sentiments, that free discussion, the dialectic exchange of ideas and theses, would generally lead in science as well as in the political arena to truth and the politically correct. "Freedom shall lead ye to truth" is sharply opposed to the authoritarian doctrine : *my* (2) "truth shall make ye free."

(2) It might be suggested that the relevant implications of the Biblical phrase first become fully manifest when read in the setting of the previous verse : "Then said JESUS to those Jews which believed on him, If ye continue in my word, then

Belief in the "eternal truths of reason" is broken through by the relativism of positivistic science as well as by parliamentary democracy. In its place appears the belief in unlimited discussion as a means of arriving at the true. This, suggests SCHELER, with its Poincarean doctrine of conventionalism, of pragmatism which tests assumptions simply by an appeal to convenience, has as a consequence a *Zersplitterung* which comes dangerously close to an opportunism of the interests which prevail at any moment. Hence, it leads — this was written in 1923 — in the sphere of knowledge to a demand for an "established truth" and in the political realm to the drive for the abolition of an antiquated parliamentarism, to a readiness for dictatorship, from the right or left.

„So hat der liberale Szientifismus und der parlamentarische Demokratismus sich eben in diesem gemeinsamen Prinzip langsam fast totgelaufen, um (noch) nur literarisch — nicht politisch — bedeutsamen Verzweiflungsschreien nach ‚Dezision', Diktatur, Autorität Platz zu machen." (138)

MANNHEIM's recently translated work (3) is primarily concerned with the examination of human thought as it operates in political life "as an instrument of collective action" and not as it is normatively described in textbooks on logic. Upon the assumption that it is the will of members of groups to change or to maintain the realms of society and nature which guides the emergence of their concepts, problems and modes of thought, MANNHEIM seeks to discriminate and isolate various styles of thinking and to relate them to the groups in which they arise. The fact that thought is so rooted in a social milieu need not lead to error but may provide a perspective for observing aspects of a problem which would otherwise be overlooked. Contrariwise, a given social position so limits one's point of view as to obscure various facets of the situation under scrutiny. These conceptions are developed by MANNHEIM in connection with his discussion of the two basic concepts, ideology and utopia.

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are ye my disciples indeed; And ye shall know the truth, and the truth shall make ye free." JOHN, viii : 31, 32.

(3) We are indebted to Prof. LOUIS WIRTH and EDWARD SHILS for a lucid translation of a particularly difficult work. This volume combines MANNHEIM's widely-heralded *Ideologie und Utopie*, first published in 1929; his article "Wissenssoziologie", published in the *Handwörterbuch der Soziologie*, edited by ALFRED VIERKANDT; and an introduction written especially for the English edition.

The concept "ideology" is an outgrowth of political conflict in the course of which it appears "that ruling groups can in their thinking become so intensively interest-bound to a situation that they are simply no longer able to see certain facts which would undermine their sense of domination." (p. 36) As a result, the social judgments of the dominant strata constitute an apologia for the existing order. Ideologies are of two types : particular and total. The particularist version maintains that the views *of our opponent* are so bound up with his class position that he is unwilling or unable to admit considerations which destroy his claims to dominance. Historically, the first step toward the change of the particularist to the total conception was taken by KANT in his development of a philosophy of consciousness. This held that an infinitely variegated world is transformed into a unity through the unity of the perceiving subject who evolves principles of organization (categories) for understanding this world. The subject is not a concrete individual but "consciousness in itself," which, viewed by HEGEL in historical perspective as subject to continuous transformation, becomes the *Volksgeist*. With MARX, the folk-spirit is broken down into consciousness of classes and unitary perspectives are held to be peculiar of classes rather than of peoples, times, or nations.

It is possible to divide the total conception into special and general forms. Special, by interpreting *opponents*' views as a mere function of their social position; general, when the analyst subjects all points of view, *including his own*, to ideological analysis. "With the emergence of the general formulation of the total conception of ideology, the simple theory of ideology develops into the sociology of knowledge." (p. 69) This general total conception is finally divided into an evaluative, which is concerned with the epistemological bases of ideas, and a non-evaluative type, which seeks simply to ascertain how certain social relations give rise to particular interpretations.

The second of MANNHEIM's basic pair of concepts is that of utopia. Oriented toward an as yet non-existent but concretely realizable state of affairs, conceptions which, once they pass over into action, break up the existing order, are utopian. In contrast to ideologies which are illusory, utopias (as thus defined) are true. Manifestly, this involves an *ex post facto* criterion of truth

since it is otherwise impossible to ascertain which ideas will be translated into actual situations.

Inasmuch as MANNHEIM has severely delimited, if not eliminated, the realm of valid thinking, he is compelled, as were his predecessors, to justify his own observations as true and not merely ideological. This he strives to accomplish by indicating that there is an "unanchored, *relatively* classless stratum, the socially unattached intelligentsia" (sozialfreischwebende Intelligenz), who can, by virtue of their detachment, transcend class perspectives and attain valid thought, which integrates the various partial points of view. And, by necessary inference, it is in this stratum that MANNHEIM finds his place. Once again, the grounds of validity are found not in objective canons of truth but in the characteristics of a specifically defined group. And on what basis can one establish this premise?

In the course of his invariably stimulating discussion, MANNHEIM states a number of theorems which might more advisedly be construed as suggestive hypotheses. It is only in a highly differentiated society, characterized by high social mobility and democratization, that the confrontation of incompatible and mutually unintelligible universes of discourse leads to relativism. The sociology of knowledge could itself arise only in such a society where, with the emergence of new and the destruction of old basic values, the very foundations on which an opponent's (4) beliefs rest are challenged.

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(4) The use of the term "opponent" or "adversary" reflects the political source of MANNHEIM's thought and its general inapplicability to scientific developments. The function of political controversy, in contrast to scientific criticism and discussion, is personal or party aggrandizement at the expense of 'opposing', 'competing' persons or parties. Hence, the objective of discrediting one's opponent *à tout prix*. In science, the "opponent", if it be permitted to revert to anthropomorphism in order to find a parallel, is "ignorance" or the "resistance of nature to the uncovering of its secrets." To be sure, because of social factors which are extraneous to the pursuit of science itself, the same elements of personal aggrandizement and loyalty to a "school" or faction may intrude themselves into scientific pursuits. But these are considered to represent unfortunate deviations from the governing norm of impersonality; they are not tactical expedients for the specific end in view. In fact, it is the essential function of this norm of impersonality to preclude these emotional involvements of scientists with certain of "their" theories, so as to leave them willing and ready to foresake these theories when new facts demonstrate their inadequacy. The sentiment basic to science adheres to the dominating idea of "the search for truth" and the intrusion of other sentiments

MANNHEIM propounds the further thesis that "even the categories in which experiences are subsumed, collected and ordered vary according to the social position of the observer." (p. 130) An organically integrated group conceives of history as a continuous movement toward the realization of its ends; socially uprooted and loosely integrated groups espouse an a-historical intuitionism which stresses the fortuitous and imponderable. The well-adjusted conservative mentality is averse to historical theorizing since the social order, which is viewed as "natural", presents no problems. Only the questioning of the *status quo* by opposing classes leads conservatives to defensive philosophical and historical reflections concerning themselves and the social world. Furthermore, conservatism tends to view history in terms of morphological categories which stress the unique character of historical configurations, whereas advocates of change adopt an analytical approach in order to arrive at units which may be recombined, through causality or functional integration, into new wholes. The first view stresses the inherent stability of the social structure *as it is*; the second emphasizes changeability by abstracting the component elements of this structure and rearranging them anew.

In so far as it claims epistemological relevance, MANNHEIM's discussion has been subjected to a thoroughgoing critique by Dr. VON SCHELTING (5), who clarifies many of the controversial issues involved. His leading objections may be briefly summarized. 1. The imputation of ideological thought to one's opponent is a rhetorical device which as a social phenomenon may be profitably studied by social science, but it is doubtful

(personal vainglory, economic and political status, etc.) is apt to disturb this umbiassed pursuit of truth. Hence, also, the jealous reaction of the scientist when loyalties to other institutions, e.g. the State, are demanded of him *qua* scientist, since these, as in the case of PHILIPP LENARD's denunciation of EINSTEIN's "Jewish physics", interfere with the institutionalized functioning of scientific research.

(5) We are here concerned only with that section of SCHELTING's book, namely pages 73-177, esp. pp. 117-167, which deal directly with the sociology of knowledge. It may be said in passing that the work as a whole contributes much to our understanding of MAX WEBER's methodology and clearly demonstrates its importance for present day research in the social sciences. Cf. also SCHELTING's lengthy review of MANNHEIM's *Ideologie und Utopie* in the *American Sociological Review*, August 1936.

whether we are justified in adopting ideology as a central concept. 2. In the total version of the ideology concept, the entire structure of an individual's thought is involved. Hence there can only be ideological thought, and even science, especially social science, becomes bound to social position and is consequently invalid. How, then, can MANNHEIM claim validity for his own thought? Whether MANNHEIM has been led to this familiar relativistic impasse is, however, a moot point which does not lend itself to a ready solution. At times, MANNHEIM maintains that the determination of thought by social position is not necessarily a source of error, but may often afford an opportunity for insights which are otherwise not possible. (6) In other contexts, he asserts that such determination destroys the possibility of valid thought (7). It seems that these contradictions rest upon a twofold confusion. In the first place stands the tenable thesis of a greater *probability* of distortion and error when interest and sentiment not only motivate but also pervade the very act of cognition. This is the familiar personal and social equation. But this is confused with the *necessity* of significant bias in all situations involving "vital interestedness." Secondly, the fact that one's interests and consequent definition and limitation of the problem are related to class affiliation is at times unwarrantably assumed to imply that judgments within this limited sphere are necessarily incorrect. These are essentially distinct propositions: the grounds for choice of a problem imply nothing about the status of its solution (8).

3. SCHELTING properly indicates MANNHEIM's serious confusion of essentially different spheres. Ethical and aesthetic norms, political and religious beliefs (prejudices and convictions) and scientific judgments are all lumped under the one rubric "Wissen", (I & U, pp. 22, 72, 84) and considerations which are applicable to some of these phenomena are tacitly extended to all. On

(6) See, for example, pp. 42, 72, 111, 124, 153, 254.

(7) See, for example, pp. 61-62, 175-6, 184.

(8) In his essay on *The Sociology of Knowledge*, MANNHEIM tempers his views and grants the possibility of particularized validity to different observers in the same class position who "on the basis of the identity of their conceptual and categorial apparatus and through the common universe of discourse thereby created, arrive at similar results." (p. 270) But MANNHEIM does not concede the possibility of objective judgments transcending class position.

what grounds may one attribute or refuse "validity" to ethical norms! 4. MANNHEIM's multiple criteria of "truth" — an idea's fulfilment of function, active efficacy, etc. — are non-cognitive, non-theoretical bases for evaluating ideas. Moreover, they presuppose the very concept of objective validity which they purport to supplant. 5. If super-particular validity is vouchsafed the "socially unattached intelligentsia", how does one arrive at this valid generalization, except by epistemological fiat, and secondly, how can one objectively establish the fact that a specific individual is "socially unattached"?

6. MANNHEIM freely grants that the "psychological genesis" of ideas is irrelevant to the problem of their validity. Yet, he maintains that the "social genesis" of thought involves such relevance because it is a "meaningful genesis." This is only apparently convincing. The argument rests on the confusion of the theory of the irrelevance of genesis for the *meaning* of a judgment (which no one denies) with the doctrine of the irrelevance of genesis for the *validity* of a judgment. Only the latter is maintained by epistemology.

7. Finally, the thesis of historical change in the categories of thought has not been demonstrated. In the course of such nominal "demonstrations", comparisons are characteristically made, not between the categories involved in the positive thought of various peoples, but between these and the categories basic to religious or magical conceptions. This fallacy, which is shared by both MANNHEIM and SCHELER, is especially conspicuous in the work of LÉVY-BRUHL, JERUSALEM and their disciples. In controverting this thesis, it can be shown *a*) that in realms other than that of positive knowledge, the negation of the principles of identity and contradiction is prevalent even in our own day and *b*) that in primitive groups, in addition to spheres where "pre-logicality" is dominant, there exists a corpus of technical knowledge which presupposes the canons of logic and verification basic to positive thought.

Once we leave this general problem of the epistemological relevance of the sociology of knowledge, disagreement gives way largely to consensus. If this discipline is to bear fruit, if it is to provide insight and understanding of the complex interrelations of thought and society, it would seem advisable that its investi-

gations be restricted to problems which lend themselves to tests of fact. In his preface to MANNHEIM's work, Professor WIRTH describes some of these fundamental problems.

1. Determination of the shifts in the foci of intellectual interest which are associated with changes in the social structure (changes in differentiation, stratification, etc.)
2. Analysis of the mentality of a social stratum, with due regard for the factors which determine acceptance or rejection of particular ideas by certain groups.
3. Studies of the social evaluation of types of knowledge and of the factors determining the proportion of social resources devoted to each of these types.
4. Studies of the conditions under which new problems and disciplines arise and decline.
5. Systematic examination of the social organization of intellectual life, including norms guiding such activity, sources of support, direction and foci of interests involved in such organization.
6. Study of the agencies facilitating, impeding and directing the transmission and diffusion of ideas and knowledge.
7. Studies of the intellectual : his social origins, means of social selection, degree of change or shift in class loyalties, incentives for particular pursuits, associated interests.
8. Analysis of the social consequences of scientific, and particularly technological, advance.

It is likely that the emphasis upon the metaphysical and epistemological implications of the sociology of knowledge can be traced, in part, to the fact that the first proponents of this discipline stemmed largely from philosophical rather than scientific circles. The burden of further research is to turn from this welter of conflicting opinion to empirical investigations which may establish in adequate detail the uniformities pertaining to the appearance, acceptance and diffusion, or rejection and repression, development and consequences of knowledge and ideas.

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Reviews

Evan Morgan.—*Tao, the Great Luminant*. Essays from HUAI NAN TZŬ with Introductory Articles, Notes, Analyses. Foreword by J. C. FERGUSON. xlv + 291 pages. KEGAN PAUL, TRENCH, TRUBNER & Co., London n.d. (1936?).

This is the first translation into English of any large portion of the essays of HUAI NAN TZŬ, eight out of the twenty-one essays being translated. It is a contribution of the first importance to our knowledge of Taoism. LIU AN (died 122 B. C.) was Prince of Huai Nan and editor of the famous essays in the work known as "HUAI NAN TZŬ" He was a man of great learning and very popular, and attracted to himself men of talent and similar tastes, particularly those inclined to Taoism. "Amongst the latter there were eight famous scholars. They gathered together for study and chose the subject of *Tao* and *jen,i*,Love and justice as the theme. This is how the essays of HUAI NAN TZŬ came to be written. The main theme is akin to the principles of LAO TZŬ : sober and serious thought and *wu wei* were the leading themes and the function of *emptiness* and *tranquillity*, and so on, in life. They discussed everything in their conferences, as will be seen from the titles of the 21 essays. The range of search was wide, and history was ransacked for proof of the theories advanced. The question of the gains and losses in following the *Tao* was a central theme. There was nothing in Heaven and Earth that did not arouse the curiosity of their enquiring minds. It was this fund of variety, this exuberant research into every department of life, in the search for a true standard — or to put it in another way — this exuberant search into the nature of the *Tao* that finally led to the name of *hung lieh*, "greatness and luminosity",i.e., " the *Tao*", being given to the book. Scholars who have not read the book will fail to realise the profound significance attaching to the *Tao*, by the fraternity. It is a most illuminating treatise on the profound subject of the *Tao*."

The first editor of the essays (after LIU AN) was KAO YU who reported certain facts relative to the life of LIU AN, that he was the son of Prince LI who was the son of the Emperor KAO by a Court Lady of the Prince of CHAO. "In modern times Mr. LIU WEN-TIEN, has spent most of his life revising and editing the text. The result of his work was published

on June 15th of the 10th year of the Republic. His edition was published by the Commercial Press in 6 volumes, with a Preface by Dr. HU SHIH. "This edition EVAN MORGAN regards as the best edition of the work. For legendary stories about LIU AN and his traditional relation to early alchemy, see *Isis*, 18, 227 (1932); 25, 328 (1936). The eight *hsien*, who, according to the "Complete Biographies of the Immortals", came to his Court and taught him about the *Tao* and the practice of alchemy, are evidently the eight scholars who wrote the essays of HUAI NAN TZŬ.

EVAN MORGAN's translation is smooth and pleasant reading, and perfectly intelligible. *Tao* is often, but not always, translated "Cosmic Spirit." In the Preface MORGAN gives his "opinion on what a translation should be. It should always convey a definite meaning and be expressed as clearly as possible. The translation should be as near the original as possible. But the chief requisite is that each sentence must have a meaning clearly expressed. Otherwise the translation is useless. It is admitted that a paraphrase may sometimes be necessary; but if this conveys the meaning, it will be a good translation."

The introductory chapter contains essays on The Life and Times of LAO TAN (written from materials supplied by Mr. M. T. LIEN), on The Two Worlds, the World of Spirit and the World of Sense, on Freedom of Life, on *Tao*, on *Wu Wei* (not doing), on Persistence and Continuity (the Uniformity of Birth and Death), and on LIU AN, the Prince of Huain Nan. The eight translated essays are as follows · I. The Cosmic Spirit; II. Beginning and Reality; III. Life and Soul or the Keeper of Life; IV. Natural Law; V. The Response of Matter to the Movement of the Cosmic Spirit; VI. A Compendious Review of the Influence of the Cosmic Spirit on the Universe; VII. Generalship and Prevention of Anarchy; and VIII. Endeavour and Duty. The essay on Natural Law does not, as one might expect, contain much science. It conveys an idea of the state of art and culture in the time of LIU AN, but it concerns itself chiefly with the point that the doings of man have tended to upset the balance of *Yin* and *Yang*. Human institutions and inventions have resulted in the concealing and glossing over of the really important principles of conduct. (God hath made man upright; but they have sought out many inventions. Ecc. vii, 29.) "There are, therefore, principles in the service of parents, love being the predominant factor. There are demeanours and miens observed in the Court, with the feeling of reverence as the chief factor. There are ceremonies in the observances of mourning, but the dominating idea is grief. There is an art for the use of the military, and justice should be the ruling idea in their employment. Build on the foundation, and the *Tao* will operate : when the foundation is neglected, the *Tao* will fail." Essays number 3, 4, 5, 6,

9, 10, 11, 14, 16, 17, 18, 20, and 21 have not been translated. The book is supplied with a set of "Notes and Annotations" and with a set of „Elucidations and Analyses", and ends with three full page diagrams which represent the Confucianist, the Taoist, and the Buddhist conceptions of the universe.

In addition to its importance for the student of Taoism, EVAN MORGAN's book has the value which inheres in a piece of fine literature. The reviewer has found much pleasure in reading it. The margins of his copy are marked with pencil lines indicating passages which he wishes to be able to find when he wants them, and to read again and again.

TENNEY L. DAVIS.

Julius Ruska. —AL-RĀZĪ's *Buch Geheimnis der Geheimnisse*.. Mit Einleitung und Erläuterungen in deutscher Übersetzung. xiii+246 p. 5 fig. (Quellen und Studien zur Geschichte der Naturwissenschaften und der Medizin, 6). Berlin, Springer, 1937 (Rm. 38. 80).

Professor RUSKA's elaborate studies on the chemical works of AL-RĀZĪ have been repeatedly discussed in *Isis*. To speak only of the latest :

Das Buch der Alaune und Salze. Ein Grundwerk der spätlateinischen Alchemie (Berlin 1935; *Isis* 25, 144-45), about which he concluded that it was not written by RĀZĪ but by a Spaniard who flourished probably a century later.

Übersetzung und Bearbeitungen von AL-RĀZI*'s Buch Geheimnis der Geheimnisse* (Berlin 1935; *Isis* 25, 189).

Die Alchemie AL-RĀZĪ's (*Der Islam* 22, 1935; *Isis* 25, 190).

To these we may still add RUSKA's earlier study on AL-BĪRŪNĪ as a source for the study of AL-RĀZĪ which we published in vol. 5, 26-50, 1923.

The present book contains his German translation of RĀZĪ's *Kitāb sirr al-asrār* which he considers as the most fundamental Arabic textbook in the history of practical (as opposed to mystical or metaphysical) alchemy. Now if one bears in mind that Latin alchemy was derived almost exclusively from Arabic (as opposed to Greek) sources, this textbook is not only the fundamental Arabic one, but through its Latin translations the fundamental European one. The Latin text was available at least as early as the beginning of the fourteenth century, witness the existence of the Palermo ms. of that time, containing the *Liber Ebu bacchar er Raisy* which RUSKA has identified with the *Sirr al-asrār*.

Without wishing to enter into the old controversy RĀZĪ vs. JĀBIR, let me quote one of the author's conclusions (p. 12) .

"Der Abstand zwischen der unendlich vielgestaltigen Darstellung der JĀBIR-Schriften und der nüchtern sachlichen Form von RĀZĪ's Arbeiten ist so gross, dass

man über die Feststellung einer gemeinsamen Basis hinaus kaum noch weitere Beziehungen wahrscheinlich machen kann. Dann aber bleibt auf alle Fälle für RĀZĪ das Verdienst, *die Alchemie zum ersten Mal in eine streng wissenschaftliche Form gebracht zu haben.* Nicht die dem Abendland schwer zugänglichen, jede Weiterentwicklung ausschliessenden Theorien der Ismâ'îliyya, sondern die auf den nächsten Zweck beschränkten Schriften RĀZĪ's haben die Alchemisten des Westens in ihren Bann gezogen. Insbesondere geht von den Kapiteln über die Stoffe und Geräte und von den kurzen Bemerkungen über die Operationen ein dauernd wirksamer Anreiz aus, der zu immer neuen Erweiterungen und Kombinationen führt."

We may also recall that in his „Übersetzung" paper of 1935 (p. 85), RUSKA suggested that the *Summa perfectionis magisterii* (1) generally ascribed to GEBER was probably written by the author of the *Liber Ebu bacchar er Raisi.* Of course this does not yet solve the problem of the authorship of the Arabic originals, a problem which can only be solved by Arabic textual studies.

After an introduction (34 p.) including RĀZĪ's biography, and information on the Arabic and Latin MSS., RUSKA gives a series of explanations covering the subject of the treatise (47 p.), to wit, substances used by the Arabic chemist, his utensils, his technical methods, his theories, the elixirs and their virtues. The reader is then well prepared for the study of the text itself which follows (p. 83-226).

It is a pity that circumstances prevented the addition of the Arabic text, but after all only Arabic scholars will miss it. This very important contribution appeared in time to celebrate the author's seventieth birthday (February 9, 1937). We admire the intellectual heroism which enabled him to continue these very difficult studies in the German political atmosphere of to-day and hope that he may be granted the privilege of many more years of such fruitful labor and exemplary devotion.

GEORGE SARTON

Seki, Takakazu. (1642-1708)—*Seki-ryû sanpô shichibu sho* (Seven mathematical treatises) edited by the members of the Physico-mathematical Society of Japan. 28+178 pp. 2 plates, diagrams. Tokyo, Sanshu sha, 1907. (yen 1.20).

TAKAKAZU or KÔWA SEKI was born in 1642 in Fujioka, Kôzuke Province. His father was an accountant in the Shogunate. At the age of six he surprised his father by his proficiency in numbers. In 1658, the theory of *tengen* expounded by CHU SHIH-CHIEH of the Yüan dynasty in China was introduced to Japan. This system which resembles the Western algebra was studied by TAKAKAZU and soon he improved on

(1) For which see my *Introduction* (vol. II, 1043, 33, 769.)

it. His system known as the *tenso-jitsu* as Mr. MITZUKI explains is the Western algebra combined with geometry, trigonometry, and analytical geometry. He established a school of mathematics in Edo and taught in his life time several hundred pupils.

In 1708 when he died, there was no published work by him. TAKAKAZU was so busy working constantly on a new theory and teaching that he did not have time to systematize his work. His brilliant disciples KENKO TATEBE and SONÉI ARAKI collected their teacher's works and provided the means of preserving his manuscripts.

On the two hundredth anniversary of TAKAKAZU's death, the Physico-mathematical Society of Japan decided to publish seven of his short treatises which show clearly the development of his theory. The introduction includes a short biographical sketch, a list of his works, and a genealogical table of the Seki school of mathematicians.

Library of Congress. SHIO SAKANISHI.

William Herbert Hobbs. — PEARY. 502 p. New York, MACMILLAN, 1936.

Professor HOBBS' complete record of the life of PEARY is a timely publication. The waves of the COOK "controversy" quieted down with complete discredit for COOK, and PEARY emerged as one of the greatest explorers of all times.

The book is an exact record of the life of PEARY written in a simple, objective scientific manner. But the most exact rendering of this life story is more exciting than fiction.

PEARY was born in 1856 at Cresson, Pa., where his father was engaged in "shook" business (manufacturing staves for barrels). The family came from Portland, Maine. The mother and the boys returned after the father died when ROBERT EDWIN was three years old. As a boy PEARY was a good student and also a good athlete. He loved the outdoors. After graduating from Bowdoin College, where he majored in Civil Engineering, he established himself as a surveyor in Frieburg, Maine, which occupation left him enough time to indulge in two hobbies, mounting birds and horseback riding. At that time he was interested even in the lighter pleasures of life and took an active part in social activities.

In 1879, we find him in Washington, as a draftsman for the Coast and Geodetic Survey. In 1881, he was commissioned as a civil engineer in the U. S. Navy, as the principal assistant of the great engineer, A. G. MENOCAL. He surveyed the site of a possible canal in Nicaragua in 1884-85. MENOCAL in his report writes : "This important result was mainly obtained through the untiring energy, skill and devotion to duty

of Civil Engineer PEARY." Thus, curiously, the career of the greatest arctic explorer began in the tropics.

Inspired by a book of KANE's explorations in the Arctic, his active mind could not rest until he had devised a sledge and made plans to cross the inland ice of Greenland. He realized his dream in 1886 when he climbed the Greenland ice cap in the company of CHRISTIAN MAIGAARD. He penetrated to the height of 2755 feet, about a hundred miles from the rim of the ice, farther than anybody ever before.

In 1887, he again surveyed in Nicaragua as subchief engineer of the MENOCAL party. He was in charge of 45 engineers and a hundred rodmen and laborers. A complete plan of the canal prepared under the direction of PEARY in 1888 estimated the cost of the canal at $ 200,000,000. It was only after long discussion that the United States Congress decided on the Panama route, and at the present time we see a revived interest in the Nicaragua route.

It was here in Nicaragua that PEARY acquired his colored servant, MATTHEW HENSON, who later accompanied him on all his expeditions as a most devoted helper and companion.

In 1888 PEARY married JOSEPHINE, daughter of Professor H. H. DIEBITSCH of the Smithsonian Institution. If PEARY was the typical example of an explorer, JOSEPHINE certainly was that of the explorer's wife, always helping, yet remaining in the background and never grudging when her husband left her alone for years.

NANSEN crossed the Greenland ice cap that same summer. This upset PEARY's plans, leaving him only northern Greenland as a possibility of major achievement. His plans were realized in 1891, and his party of seven sailed on a 280-ton barkentine to Inglefield Gulf in northwestern Greenland. On the boat PEARY's leg was broken. One of the attending surgeons was FREDERICK A. COOK. A few months later, PEARY, in return, saved COOK from freezing in a snowstorm which blew off the top of their shelter. PEARY and FIVIND ASTRUP crossed North Greenland, travelled over a thousand miles to Navy Cliff and back, established, but did not prove the insularity of Greenland, and made exact observations all along. This was the first dog-sledge journey over the ice cap. It should be mentioned that the two men had many narrow escapes. This expedition established PEARY as an outstanding Arctic explorer. Hardly having arrived home, PEARY began planning for a second expedition. He delivered 165 lectures to raise funds.

The second North Greenland Expedition started in 1893, with 14 members. Among them was Mrs. PEARY, who gave birth to her first child, MARY ANNIGHITO, at Anniversary Lodge. In 1894, the party did not succeed in crossing the ice cap on account of bad weather and an epi-

demic of piblockto, a dog disease. During the summer of '94, PEARY and H. J. LEE made a remarkable sledge journey to south Bowdoin Bay to the "Iron Mountains" of Savikesoak Bay. These were found to be three great meteorites, one of them 100 tons. PEARY later brought them to the American Museum of Natural History. In 1895, PEARY, accompanied by LEE and HENSON again crossed over the ice cap of North Greenland. This crossing was nearly disastrous on account of LEE's frozen toe, but proved little more than the first crossing.

PEARY's next plan called for a ship which would carry the party directly into the Arctic Ocean north of Greenland, from where he could make a dash to the pole. This, however, was not accomplished during his journey in 1898. His ship was beset in the Kane Basin in '98 and PEARY explored the region westward on Grinnell Land where he corrected the false map made previously by GREELY and eliminated Schley Land from the map. Later in the winter PEARY advanced north to Conger where the GREELEY expedition almost perished fifteen years before. As a result of this expedition, PEARY's toes were frozen and had to be amputated. In the summer of 1899, PEARY mapped Kane Basin and ascended Grinnel Land ice cap to 4,700 feet, and collected so many musk oxen that the next year's food supply was assured. The chief result of the 1900 expedition was accomplished by a sledge journey around northernmost Greenland, proving the insularity of this northernmost land of the earth. On this great sledge journey PEARY organized for the first time supported advance parties.

At this time the PEARY Arctic Club was founded chiefly by the efforts of NORRIS K. JESUP, aiding PEARY to carry out his work.

1901 was spent mostly in forwarding advanced caches for his dash across the Pole. In 1902, he reached 84° 17 1/2' before being stopped by canals and crushed ice.

After returning from his four years in the Arctic, PEARY set out to have a ship built by which he could force his way into the Arctic Ocean. In 1905, the new "Roosevelt", led by Captain ROBERT BARTLETT crushed the ice of the narrow channel west of Greenland and succeeded in reaching the Arctic. The dash to the pole was made in 1906 with five advance parties, each consisting of three or four Eskimos under a white man in command, the last being the party of PEARY himself, supplied for the final dash to the pole. The system unfortunately broke down on account of big leads (canals) and a strong, sudden shift in the ice. In spite of this, PEARY reached 87° 6', the farthest north at that time. In the same year PEARY undertook another six hundred mile sledge journey around the unknown northern coast of Grant Land, accompanied by HENSEN and GRANT. Unfortunately, it was unusually warm during this journey

and the party often had to proceed chest deep in water, and the hardships endured on this journey exceeded any previous ones. PEARY's shoes rotted; he made foot gear from tin cans and the party almost perished. To add to their misfortune, the "Roosevelt" was badly damaged and the return voyage of the crippled boat was "one of the classics of the sea".

Hardly having returned home, PEARY prepared for his eighth expedition. The plans were that each supporting party should immediately return after delivering its load, thus lessening the leader's responsibility. To do this it was necessary that the party leader be able to determine his position on the ice. When the newly fitted "Roosevelt" sailed under Capt. BOB BARTLETT, the members included HENSON, DONALD B. MACMILLAN, GEORGE BORUP, Dr. J.W. GOODSELL, and Prof. ROSS G. MARVIN, who was later killed in the Arctic. Everything was planned to the greatest detail. The expedition started from Cape Sheridan on the Arctic Ocean. The expedition almost came to grief on account of the many leads in the ice which somewhat mixed up the system, but eventually everyone arrived and PEARY's and HENSON's parties were able to make their final dash from the advanced base at 87° 47', and the pole was reached on April 6, 1909. The return journey was made with great speed before the spring openings of the leads and before food gave out. 413 miles were sledged in 16 marches to Cape Columbia on Grant Land.

The reaching of the North Pole was the result of extreme persistence combined with the leadership and experience of a great man. But as so often happens, the greatest often fall victims of foul play.

FREDERICK A. COOK, who took part in PEARY's first expedition, claimed that he reached the North Pole in 1908. Although COOK had no proof whatever and his journey was utterly unbelievable to anybody knowing Arctic conditions, he received public acclaim in spite of the fact that all the scientific societies were against him. This was not the only false claim of COOK. He also claimed to have climbed Mt. McKinley, the highest peak of North America, on its southern slope. The airplane photographs of BRADFORD WASHBURN of 1936 show conclusively that this sheer cliff is utterly unclimbable.

PEARY also planned a voyage to the South Pole, but its discovery in 1911 prevented him from doing it. During the World War, we find him as an advocate for air defense, and an organizer of the aerial coast patrol system. PEARY died on February 20, 1920 of pernicious anemia.

Every page of the book reflects PEARY's great personality. He was hard, somewhat brusque, ambitious, but extremely reliable, just, and loved by the ones close to him. The Eskimos regarded him as a demigod. It is a peculiar irony of fate that had PEARY been living a decade later the gruelling hardships which he and his crew suffered could have been

easily avoided with the help of radio and airplane, and a cure for the malady which killed him was discovered eight years later.

Professor HOBBS' book is written by a scientist, clearly grouped, simply written, full of data and documentary evidence. Nowhere does the author — although he is an Arctic explorer of no small renown — inject himself into the foreground. As a friend of PEARY and his family, he was in a position to give first-hand information, and the book was prepared with painstaking research. The book is supplemented by appendices, a family tree of PEARY, a bibliography, observations of PEARY at the North Pole, a record of outstanding dog-sledge journeys; medals and rewards, etc. In spite of its scientific treatment, the book is interesting reading for our enlightened public, and an inspiration for purposeful living.

(*Harvard University*) ERWIN RAISZ.

Benjamin Farrington. – *Science in antiquity*. 257 pp. The Home University Library of Modern Knowledge, London, THORNTON BUTTERWORTH Ltd., 1936.

This little book intended for popular consumption does not pretend to be original or even critical. The treatment is chronological instead of ideological, with emphasis on the spirit of inquiry and speculation rather than on the palpable achievements of technical knowledge. There are chapters on Egypt and Mesopotamia, The Ionian Schools, The Italian Schools, The Atomic Theory, Greek Medicine, SOCRATES and PLATO, ARISTOTLE, The Alexandrian Age, The Graeco-Roman World, and a Summary and Conclusion. The author blames SOCRATES and PLATO for breaking with Ionian *historie* and credits ARISTOTLE for rescuing Greek intellectual life from Platonic idealism. He has discussed pure philosophy somewhat expansively, in view of the compendious nature of the book, and at the expense of science proper, important phases of which are mentioned only casually or disconnectedly. The problems of substance and of perception are thus treated coherently, while the history of the problems of the brain in physiology and of the planets and the year in astronomy is scattered piecemeal. It seems that a fuller development of the setting and implication of scientific events might have been more pertinent and interesting to those who will be drawn to the book by its title. There is a good index and a bibliography of twenty-two titles, but no documentation and no illustrations. The presentation of the facts, as far as it goes, is generally reliable, and the following remarks are not intended to impugn it.

On pp. 17f. the Sothic period is discussed. The Egyptian calendar

year of 365 days was allowed to differ from the solar year without adjustment by intercalation. A Sothic cycle was the length of time in which the calendar would gain one whole year on the sun, and the star Sothis (Sirius, Canicula) would again rise on New Year's Day, as it had done supposedly at the original institution of the calendar and as it did in 139 A. D. (CENSORINUS XXI 10). The common reckoning of ancients and moderns alike is that the calendar would lose one fourth of a day every year and hence that it would lose a whole year in $365 \times 4 = 1460$ years. The original institution, therefore, was three cycles before 139 A. D., namely ca. 4239 B. C., and this year is actually now in vogue as the earliest established date in history. C. SCHOCH and P. V. NEUGEBAUER have shown that the Sothic periods probably began in 4228, 2770, and 1314 B. C., and in 141; the corresponding lengths of the periods were 1458, 1456, and 1454 years; the average duration of the Sothic period was 1456 years.

On p. 186 ERATOSTHENES' measurement of the circumference of the earth at 250,000 stades is "worked out in our units" as 24,662 miles. The Greek stade was a unit of 600 feet and varied in actual length according to the standard of the foot. There is some uncertainty as to the standard used by ERATOSTHENES. FARRINGTON follows VIEDEBANTT in assuming a stade of ca. 159 m. LEHMANN-HAUPT, however, has shown that such a stade never existed, and that ERATOSTHENES used a tenth-of-a-mile stade of 148.8 m. This accords with the evidence wich seems to show that POSIDONIUS, using the Eratosthenean standard, measured the circumference at 240,000 stades, which he then converted into 180,000 ordinary Philetaerian stades of 198.4 m. See *Klio* XXVII (1934), 258f. On this standard ERATOSTHENES' circumference would be 23,115 miles. The actual mean circumference is 24,857 miles. Too close an approximation is improbable, as ERATOSTHENES' method involved several errors.

On p. 189 ERATOSTHENES is said to have "located Ireland in its right position relative to Britain" on information from PYTHEAS of Marseilles. There is no evidence that either PYTHEAS or ERATOSTHENES knew of the existence of Ireland, and both CAESAR and STRABO were still unable to locate it in its right position relative to Britain. See *Real-Encycl. der class. Altertumswissenschaft* VIII (1913), 1389.

On p. 69 the author sees the influence of HIPPODAMUS of Miletus (ca. 450 B. C.) in the geometrical lay-out of the Roman camp. The Roman custom goes back far beyond HIPPODAMUS to the *terremare* and lake-dwellings of the Bronze Age. See *Reallexikon der Vorgeschichte* XIII (1929), 259.

(*University of Illinois*) AUBREY DILLER.

Suzuki, Daisetz Teitaro.—*An introduction to Zen Buddhism.* 170 p. Kyoto, Eastern Buddhist Society, 1934. American agent: Boston, MARSHALL JONES Company. Price $ 1.75.

To the question, "What is Zen?" Dr. SUZUKI replies that Zen is the whole mind. There are in Zen no sacred books or dogmatic tenets, nor are there any symbolic formulae through which an access might be gained into the significance. Zen teaches nothing, and whatever teaching there is, it comes out of one's mind, and Zen merely points the way. There is no God in Zen. It states, "the immaculate Yogins do not enter Nirvana and the precept violating monks do not go to hell." Zen is the spirit of a man, and believes in his inner purity and goodness.

Rising out of the Far Eastern Buddhism, it claims to transmit the essence and spirit of Buddhism directly from its author, and not through any documents or rites. Personal experience is everything in Zen. On the other hand common-sense way of looking at things is not final; Zen insists that we acquire a new point of view, since the ordinary logical process of reasoning is powerless to give final satisfaction to our deepest spiritual needs. By constant negation of the logical system upon which we have been nourished, we attain a higher affirmation where negation and assertion are unified, and this is called the essence of Zen.

Zen is practical; hence it never wastes time or words in explanation. Dr. SUZUKI writes: "A gong is struck and its vibrations instantly follow; if we are not on the alert, we fail to catch them." The ultimate goal of Zen is an intuitive understanding, in contradiction to intellectual and logical understanding. It is obtained through meditation and discipline, which are fully explained in the *Training of the Zen Buddhist Monk*.

In the present volume, Dr. SUZUKI gives enough illustrations from the sayings of great Zen masters to explain the baffling problems connected with the doctrine, and yet often the real significance is hard to grasp without a little more explanation. As he repeatedly states the essence of Zen cannot be got through explanation, and yet for an average Westerner a sentence or two here and there pointing toward the correct interpretation of the problems might help much to facilitate his understanding. Nevertheless, the volume is significant since this is the first book that deals with the mystery of Zen for laymen.

S. S.

Suzuki, Daisetz Teitaro.—*The training of the Zen Buddhist monk.* With illustrations by ZENCHU SATO. xiv + 111 p., 43 plates and

illus. Kyoto, Eastern Buddhist Society, 1934. American agent: Boston, MARSHALL JONES Company. Price $ 2.50.

After reading through Dr. SUZUKI's *Introduction to Zen Buddhism*, one naturally wonders what sort of training a Zen monk goes through in order to attain that spiritual insight which has been referred to as the foundation experience of Zen. In its beginning, there was no specified method; a master would communicate his truth by striking a novice with a stick, slapping him in the face, or kicking him down to the ground. Through incoherent ejaculation or a hearty laughter, or even with abusive remarks, he endeavored to enlighten his truth-seeking disciple. With the development of the *koan* exercise in the 11th century, the understanding of Zen came to be much easier. *Koan*, literally meaning "official document," is a kind of problem given to students for solution which leads to the realization of the truth.

The initial training of a Zen monk takes place at the Seat of Perfect Wisdom, built for the purpose. After his initiation to the Brotherhood, at once his life of humility begins with begging, which besides its economic value, has a two-fold moral significance: one is to teach the beggar humility and the other is to make the donor accumulate the merit of self-denial. Secondly a motto, "A day of no work is a day of no eating," is the rule of Zen discipline. They are engaged in all kinds of manual labor and the monastery is self-supporting. Through the life of service, they learn to make the animate and inanimate objects live. "To make the living use of a thing," means to develop its efficiency to the highest possible degree. Through the life of labor, service, and humility, the monk attains the life of prayer and gratitude. In Zen Buddhism prayers are offered to all the Buddhas and Bodhisattvas of all time, and they are more in the form of self-reflection and vow than asking for help in the execution of desires. Finally he comes to the life of meditation which is the central fact of the Zendo life, where the claims of the body are minimized in order to divert their course to a higher realm. Study of the old master's sayings, tea ceremony, and discourse with fellow students are the routine of their life, and upon the completion of the term a novice is ready to go into the world. S. S.

Prafulla Chandra Rây.—*Life and Experiences of a Bengali Chemist.* Vol. II. viii + 469 pages. Calcutta, CHUCHERVERTTY, CHATTERJEE & Co., Ltd.; London KEGAN PAUL, TRENCH, TRUBNER & Co., Ltd., 1935.

For a review of Vol. I see *Isis*, 21, 431 (1934). The second volume will

be of more interest to the student of social, political and economic history than to the student of the history of science. It will be especially interesting to a student of the recent history of India or to a student of England's colonial policy. The author does not like many of the things which England has done and is doing in India. His reasons are good, his evidence convincing, and his arguments fully supported by quotations as often from English as from Indian sources.

The book contains twenty-four chapters, an appendix, and an index. Five chapters and an additional appendix-chapter are included under the general heading "Impact of West with East." They deal with such matters as government educational institutions, mass education, the creation or a vernacular literature, the wastage of time and energy by Hindu youth, neglect of primary education, illiteracy, and the educational backwardness of the Moslems as compared with the Hindus. Three chapters, under the heading "Socio-Economic Problems", treat of the mentality and psychology of the youth of Bengal, the neglect of sanitation and irrigation, malaria, tuberculosis, and the havoc caused by floods. Five chapters, under the heading "Politico-Economic", deal with military expenditures, the extravagance of the British government in India, the ostracism of Indians from responsible positions, India before and after the British, taxes, and the growth of Indian nationalism. Two chapters deal with "Communalism", and the remaining nine are included under the heading "Miscellaneous". Two of these have some interest for the student of the history of chemistry — beyond the general interest of the book in describing the experiences of the leading chemist of India, or rather, in describing his reactions to his experiences and the philosophy which he has induced from them — Chapter XXI, "Half a Century and After — Inorganic Chemistry and its Infinite Possibilities — The Rôle of Accident in Science — Facsimile of Handwriting of 1882, 1886 and 1935", and Chapter XXIII, "The Bengal Chemical and Pharmaceutical Works Ltd. — A Page from the Diary of 1893-94 — Dangers Ahead — Bengalis and Indians in General in Business — Causes of Their Backwardness and Failures." Other chapters of this group deal with the dilatoriness and expense of British justice in India, the expensive habits of Indian university students, the unfortunate consequences of the introduction of the European standard of living, and the author's philosophy of life. His discussions of old age and of scientific specialization are illustrated with many cases from the history of science.

The book is interesting now, and it seems likely to be more interesting in the future when time shall have given perspective to it.

TENNEY L. DAVIS.

Thomas Cary Johnson, Jr.—*Scientific Interests in the Old South.* New York, D. APPLETON-Century Co., 1936. University of Virginia Institute for Research in the Social Sciences, Institute Monograph No. 23. Pp. vi+199.

One of the greatest problems of modern historical scholarship is to effect an intelligent correlation between scientific discovery and experimental progress and their gradual acceptance by the popular mind. Here the scholar enters the border region where theory and life merge. At present this field is virtually neglected. Yet most thoughtful students will probably agree that the history of science can never be seen in its true perspective until it is viewed in its relation to the history of society. *Scientific Interests in the Old South* is a venture into this *genre* of historical writing, and as such the reviewer welcomed its appearance. It has, however, proved a disappointment.

Professor JOHNSON has ambitiously attempted to measure the extent of scientific interests in the ante-bellum South by studying the curricula of its colleges, the existence of scientific curiosity "among the people," and the extent to which the wonders of nature appealed to "Sweet Southern Girls." He also describes "the Glory that was Charleston" and "the Glamour of New Orleans," as well as the work of "scattered scientists". The author produces a vast accumulation of material, varying in quality, which, however, is so insufficiently integrated and evaluated as to distort rather than sharpen his picture. The trouble arises from his failure to set himself a criterion of what constitutes "scientific interests," nor has he clearly defined what he means by the "people of the Old South."

A clue to this difficulty appears in the preface : "The book... does not profess to be a detailed study of the scientific life of the Old South. Nor is it an attempt to compare the scientific contributions of the ante-bellum South with those of any other section of the United States, or of Europe. It is a study of the attitudes of the planters, politicians, and professional men of the Cotton Kingdom and of their wives and daughters toward the natural sciences. That this attitude was one of genuine and eager interest and that this interest in science was so widespread as to be all but universal are the theses to be defended in the following pages." By this exclusion of comparisons with contemporary developments in the North and in Europe, Professor JOHNSON deliberately rejects what seems to be the only possible standard for judgment. For when such a comparison is made Southern achievement and interest in science do not bulk as large as this book would lead one to think. Furthermore, to confine the study to the Southern aristocracy is to overlook the existence or non-existence of scientific contributions and curiosity among the great group of yeomen and poor whites who formed an over-

whelming majority of the eight million Southern whites — not to mention nearly four million Negroes. And the evidence presented hardly shows an interest "so widespread as to be all but universal" among the 384,000 slaveholders and their families who composed the planting class in 1860. This, it should be noted, the author finally admits reluctantly in his conclusion.

Many questions are left unanswered. How far did science take root among the generality of planters? The work gives the impression that dabbling in the natural sciences constituted a genteel fad throughout the South. Yet this interest seems to have eschewed the rigors of the calculus, and not to have gone much deeper than that of modern dilettanti who read EDDINGTON and JEANS in order to discourse glibly about frames of space or the FITZGERALD contraction. How far did interests in natural phenomena vary geographically and among classes? What of the back country where OLMSTEAD never saw a thermometer? The Old South was a vast and varied area. Did the surge of Southern nationalism after 1850, which appears to have been responsible for increased college attendance and a demand for Southern textbooks, contribute to an intensified scientific interest? Granting the possibility that the "decaying deism" of the Anglican group was more hospitable to science than the decaying puritanism of New England, what of the attitude of the evangelical Methodists and Baptists who made up the dominant religious groups? And is it just to praise the scientific receptivity of Southern college presidents and corporations, and to ignore the fact that the trustees of Franklin College, of which the author makes much, sought for years to stifle the spirit of scientific revolt and eventually forced the resignation of the whole faculty, including the famous brothers LE CONTE?

In estimating the role played by Southern colleges in stimulating an interest in science the author makes an exhaustive study of their catalogues. Such a procedure is of only limited validity. For example, does the appearance of five courses in various phases of Asiatic History in the curriculum of a present state university prove it to be an outstanding center of Oriental studies? Using similar sources he stresses the instruction in science offered in female seminaries in the Old South, and concludes that science played an important part in the life of Southern school girls. Should we therefore conclude that because the calculation of eclipses was required of the young ladies of Bradford Academy (Mass.) in 1803, that they were capable astronomers, or that there existed in New England any intense interest in celestial bodies?

Finally, the work of Dr. CRAWFORD W. LONG of Georgia in successfully performing operations with the use of ether in 1842 is in many ways

the outstanding contribution of the Old South to this field. Omission of all reference to this achievement is difficult to understand.

Professor JOHNSON has pioneered in a sadly neglected field and in the course of his research has brought to light much valuable information that may be of considerable use to future scholars who attempt a truly historical estimate of the role of scientific interests in the life of the Old South. Such a study must, however, be exhaustive and steadfastly critical in the examination of evidence; it should consider the views of the community as a whole, and take into account the relationship of scientific interests to the structure of Southern society; and above all, to pronounce final judgement it should measure Southern achievements against developments in the North and in Western Europe during the same age.

Massachusetts Institute of Technology CARL BRIDENBAUGH

Henry Le Chatelier.—*De la méthode dans les sciences expérimentales.* Paris, DUNOD, 1936. 319 pages.

The present book contains in a different form the same ideas as the book entitled "*Science et Industrie*" which LE CHATELIER published shortly after the war, the most important difference being that he here takes from his own work the examples with which he illustrated the various rules of the methodology of science. The reader will be glad that he has done this. The author, naturally, is able to speak with the greatest authority when he speaks concerning his own work. He gives us the mature conclusions of a seasoned veteran. The book has proved to be LE CHATELIER's valedictory. Born October 8th, 1850, he died September 17th, 1936.

The central purpose of the book is to emphasize the interdependence of science and industry. "J'ai consacré toute ma carrière à la Science industrielle", writes LE CHATELIER, "non pas par le fait d'une volonté réfléchie, mais sous l'impulsion de circonstances extérieures. Dans ma jeunesse, je n'avais jamais entendu parler de la distinction entre la Science pure et la Science appliquée." His father was attached to the *Crédit Mobilier* and directed the construction of railroads. He retained from his school days an interest in chemistry, and had a laboratory in his home. He was intimate with HENRI SAINTE-CLAIRE DEVILLE and often took his son to the laboratory at the *École Normale* where he heard discussions on the fusion of platinum and the manufacture of aluminum. "Les recherches de SAINTE-CLAIRE DEVILLE sur la dissociation, qui illustreront à jamais son nom, paraissaient, au moment même où il les poursuivait, occuper une place moins importante dans ses préoccupations que ses études industrielles."

On completing his course at the *École Polytechnique*, HENRY LE CHATELIER, because of his rank in his class, was sent to the *École des Mines* with the title of *Ingénieur de l'État*. Two years after graduating from the latter school he was "bombardé professeur de chimie", a fact which he ascribes to the benevolence of DAUBRÉE, the Director of the *École des Mines* and a friend of his father — and immediately he set to work to prepare himself properly to fill the position. "Ne sachant comment orienter mes premiers travaux", he writes, "je songeai au vieil ami de mon père, SAINTE-CLAIRE DEVILLE et j'allai lui demander conseil. Il me reçut fort mal et se moqua de moi, me disant que ma question était absurde. Dès que l'on travaille au laboratoire, on est assailli par une multitude de problèmes et la seule difficulté est de faire parmi eux un choix judicieux. Je n'avais qu'à me mettre au travail, à faire n'importe quoi et je rencontrerais bientôt des questions intéressantes." LE CHATELIER remembered certain briquettes of hydraulic cement which his maternal grandfather, PIERRE DURAND, had made and decided to study the composition of these materials. The work was his Doctor's thesis. The study required the exact determination of high temperatures, for which no satisfactory method was known. LE CHATELIER was successful in using thermocouples for the purpose, these having been suggested fifty years earlier by ANTOINE BECQUEREL, but never applied, and having been formally condemned by REGNAULT. Following this he devised an optical pyrometer for the measurement of temperatures above the melting point of platinum, and made the first determinations of the temperatures which are realized in the cement, ceramic and glass industries. Because of the phenomena which these researches brought to his attention, he devoted himself for a number of years to the study of the principles of chemical equilibrium.

Explosions were frequent in gaseous coal mines; many lives were lost annually; the French government appointed a commission to study the matter — and the technical part of the work was put in the charge of two professors at the *École des Mines*, MALLARD and LE CHATELIER. As part of a theoretical study of combustion they measured for the first time the variations in the specific heats of methane and other combustible gases at elevated temperatures. LE CHATELIER on his own account also studied the combustion of acetylene and suggested the use of the oxy-acetylene blowpipe for the autogenous welding of steel. At the suggestion of MALLARD he undertook a study of the allotropic modifications of certain minerals, and discovered the anomaly in the dilatation of quartz at 570°. He studied amorphous silica, tridymite, and cristobalite, the latter reputed to be a rare mineral, but showed that cristobalite is in reality the principal material of the silica bricks which are used in steel furnaces. "Ces études purement théoriques au début me conduisirent bientôt à des

recherches industrielles sur les produits céramiques et les verres, dans l'emploi desquels la dilatation joue un rôle prépondérant. Comme me l'avait prédit SAINTE-CLAIRE DEVILLE, j'avais plus de travail devant moi que je ne pouvais en mener à bien."

LE CHATELIER was persuaded by LAN, newly appointed Director of the *École des Mines*, to take charge of the course in metallurgy. This led him to study alloys, to develop microscopic metallography, and finally to enunciate the general theory of alloys which is definitively accepted to-day. Finally, in order to diffuse the new scientific notions, he founded with the help of a committee of steel manufacturers, the new periodical, *Revue de Métallurgie* — which still further extended his relations with industry.

When LE CHATELIER, still retaining his position at the *École des Mines*, accepted the chair of chemistry at the Sorbonne which had been made vacant by the death of MOISSAN, he found himself without time for work in the laboratory. In consequence of an article in the *Revue de Métallurgie* relative to the work of the American engineer, FREDERICK WINSLOW TAYLOR, on fast-cutting steels, LE CHATELIER entered into a correspondence with TAYLOR and became informed concerning his formulation of the principles of factory organization (the TAYLOR System). He was passionately interested in these questions, and during twelve years published many papers in which they were discussed.

At the request of the military authorities during the war, LE CHATELIER again turned his attention to the study of refractory materials, to metallurgical questions, and especially to the problem of tempering projectiles. His knowledge of the procedure of science and of the organization of the forces of production served his country in good stead. He retired from active work at the age of seventy shortly after the signing of the peace. „Pendant mes cinquante années de professorat à l'École des Mines, j'ai toujours pensé que le rôle d'un professeur ne se réduit pas à enseigner à ses élèves les résultats de la science acquise, mais qu'il doit s'efforcer d'inculquer à ses auditeurs la confiance dans l'usage de la méthode scientifique, et développer ainsi leurs facultés intellectuelles, au lieu de chercher seulement à meubler leur mémoire. A la retraite, aujourd'hui et n'ayant plus de chaire à ma disposition, j'ai voulu continuer par la plume ce que je ne pouvais plus faire par la parole."

The foregoing is a summary of the Introduction. It also indicates sufficiently the sort of material which comprises the body of the book and supplies the author with evidence for his methodological conclusions and with support for his thesis of the interdependence of science and industry. The actual chapter heading are as follows — I. Définition de la Science; II. Les principes généraux; III. L'observation des faits; IV. Mécha-

nisme des découvertes; V. Mesures expérimentales; VI. Appareils d'observation et de mesures; VII. Erreurs; VIII. Raisonnement; IX. Les lois; X. Origine industrielle de la Science; XI. Influence de la Science sur l'industrie; XII. Introduction de la Science dans l'usine; XIII. Découvertes et inventions; XIV. Enseignement scientifique; XV. Enseignement technique; XVI. Le système TAYLOR; XVII. Conclusion.

The book is important, intelligent, stimulative of thought and provocative sometimes of disagreement — a book to be chewed and digested.

TENNEY L. DAVIS.

Gino Loria.—*Scritti, conferenze, discorsi sulla storia delle matematchei, raccolti per iniziativa e pubblicati sotto gli auspici della sezione ligure della società "Mathesis,"* xv + 589 pp. Cedam. Casa editrice Dott. ANTONIO MILANI, Padova 1937-XV.

Readers of *Isis* need no introduction to Professor GINO LORIA. Article XXVIII of this new volume appeared in *Isis* I, and he has figured in subsequent volumes as a contributor of main articles and reviews and as the author of many books and articles mentioned in the Critical Bibliographies. His new book should be heartily welcomed by all those who know him as a foremost historian of mathematics and pioneer in promoting the study of its history, as well as by those to whom it will be an introduction to an author they cannot afford to neglect.

This volume is a collection of articles on the history of mathematics chosen from Professor LORIA's writings, speeches and lectures and published in commemoration of his retirement from the chair of higher geometry at the University of Genoa, which he had held for almost fifty years. Many of the publications in which these articles first appeared, especially the earlier ones, are now hard to locate, making this collection particularly valuable. In addition, the articles are well selected, showing certain definite trends in Professor LORIA's work. He has a tendency to discuss the history of science by nations, more particularly the history of Italian mathematics, but nevertheless he believes that in modern times, in contrast to the past, race and nationality play little part in scientific progress. The collection also brings out that he believes that at present the most important task of the historian of science is the investigation of such details as the labors of individual men, filling in the gaps left by the writers of monumental histories and vast outlines. His ability to portray general trends, his grasp of the history of mathematics as a whole and his vast reading, so necessary to an adequate understanding of the particular phases, is also demonstrated. His interest in the teaching of the history of mathematics is illustrated by six articles. His psycho-

logical analyses and his philosophical discussions of incidents, trends, and ideas color most of the articles, some more than others.

Repetitions are inevitable in a work of this kind, but they do not seem detrimental. Rather they seem to focus the emphasis. Omissions, too, there must be. For instance, none of the selected articles deals with Greek mathematics. The object of such a collection is to illustrate the general character of the author's work by selecting and bringing together outstanding, as well as some not easily procurable, examples. That object has been attained in this case. Professor LORIA's complete works would fill many volumes, and the excellent list of them included at the back of this collection gives the date and place of publication of both books and articles, both historical and mathematical, serving to render all of them more or less accessible, and permits the student to choose those which particularly interest him.

Those articles which were altered for publication here, were well edited. For example, the mathematical explanations which were omitted from the account of CREMONA's work are not necessary to that account and, if desired, can always be located in the indicated sections of Professor LORIA's edition of CREMONA's own writings. This edition did not appear until ten years after the first appearance of the article republished here.

Professor LORIA's book is divided into four main sections, the first of which concerns the history and teaching of mathematics. The first article under this heading discusses the question whether the history of science is a science. It is a particularly broad treatment giving different approaches to the history of science such as the telling of anecdotes; the division by nationality, more particularly in ancient times; the division into epochs of equal length; the use of dates as milestones; and the need for detailed monographs, more modest but also more profound than monumental historical works, which would fill in gaps left in these. The article also asks if a general history of science is possible or if the only satisfactory study will be the history of the separate sciences. The author discusses past historians of science and points (1912) to scientific congresses discussing the history of science, ending with a plea to historians of science to stand on their own feet. The second article is on the present (1916) state of the study of the history of mathematics. It follows very naturally after the preceding one and shows a vast insight into the questions and literature of the subject. The third article, from the 1932 volume of *Archeion*, discusses certain aspects presented by historical research in the field of mathematics, the last part of which again brings up the question of the advisability of studying the history of science as against the histories of the separate sciences. The fourth chapter also gives considerations

concerning the history of mathematics. The fifth and sixth deal with the subject of teaching.

The second section of the book contains three historical articles, one on the contributions of various nationalities to the development of mathematics, an historical account which ends by showing the growing interrelation of mathematicians of the world; a second on the psychology of mathematicians; and the third on the place of mathematics in public life, discussing the historical contributions to the psychology of the man of science.

The third and longest section contains fourteen biographical accounts, dealing with the scientific work of ETTORE CAPORALI; the life and work of FELICE CASORATI; of GAETANO GIORGINI; EUGENIO BELTRAMI; E. DE JONQUIÈRES; LUIGI CREMONA; the geometrical work of A. MANNHEIM; LAGRANGE's life and work; PLACIDO TARDY; G. LIBRI as a historian of science; PHILIP E. B. JOURDAIN, mathematician and historian of science; two great historians of mathematics, CANTOR and ZEUTHEN; the geometrical work of CORRADO SEGRE; and TANNERY and his historical work. They are clearly written and give excellent pictures of their subjects and concise accounts of the contributions of those men, with many of whom Professor LORIA had come in personal contact. The section is not entirely independent of the others. The article on CANTOR and ZEUTHEN brings out interesting contrasts and gives Professor LORIA a chance to tell what he considers important in writing history, a fusion of the human side with the development of scientific ideas.

The last section is more varied and more philosophical than the others and contains nine lectures and speeches, dealing with the transfiguration of a science; women in mathematics, a rather quaint psychological discussion of historical figures; mathematical traditions in Italy; mathematics and reality; the mathematical glories of Great Britain, a very broad and general article showing Professor LORIA's grasp of movements and trends; the eccentricity and mystery of numbers illustrating both the mathematical knowledge and the philosophical outlook of the author; LEONARDO DA VINCI and the Latin geniality; a principle of ABEL; and the social function of science.

The whole volume affords interesting reading.

New York City C. DORIS HELLMAN.

Tanaka, Tetsukichi, ed.—*Ka Etsu Nô ni okeru sûgaku* (Mathematics in the Kaga feudal clan) Kanazawa, 1936. 134 p. plates. Privately printed.

Since the early part of the 17th century, the powerful feudal clan under

the leadership of the MAEDA family produced many outstanding mathematicians, but since the introduction of Western mathematics, native science has been discredited, and these scholars are buried in oblivion. Mr. TANAKA who taught the subject for over forty years in the Fourth National College in Kanazawa lamented this fact, and after his retirement in 1926, he devoted his time collecting all the available records on this subject. In the summer of 1936, when the Conference of secondary school teachers in mathematics met in Kanazawa, Mr. TANAKA's work was published by the prefectural Education Association and was presented to the members.

Mr. TANAKA grouped ninety-seven scholars according to their schools, and their biography, list of works, and their outstanding contributions are carefully narrated. After a handful of scholars had taught mathematics in the clan till the closing years of the 17th century, the Miike school was started by ICHIBEI MIIKE of Osaka in the capital of the clan. Soon it was superseded by the SEKI school of mathematicians whose influence lasted till the middle of the 19th century. After the introduction of Western mathematics, there have been a few outstanding scholars in this new field.

Library of Congress SHIO SAKANISHI.

Mizuki, Kozue.—*Nihon sûgaku shi* (History of Japanese mathematics) with an introduction by SHIGEYASU TOKUNAGA. Tokyo, Kyôiku kenkyû-kai, 1928. 532 p. (*yen* 4.80).

The Japanese in their early days applied their scanty knowledge of numbers to work out the seasonal changes and the motion of the sun and the moon. For measuring the length of an object, they used their fingers, elbows, and arms; for weight a single pole balanced on a stick and stones of varying weight. In the beginning of the Christian era, the continental culture was introduced. In 405 WANI came from Korea as a tutor to the heir apparent, and it is said that he introduced the system of counting the years by the sexagenary cycle. The first mention of a calendar occurs under the date of the 6th month, 553. The first water-clock was made in 660. An astronomical observatory was established in Kyoto in 700, and in the following year an educational edict was promulgated. According to it, the department of science included the following subjects and personnel: Astrology with one scholar and ten students; Astronomy with one scholar and ten students; Mathematics with one scholar and thirty students; two doctors in charge of water-clocks; one doctor of calendar making with ten assistants.

Mathematics which had such a fine start in the 8th century fell under the dominating influence of Chinese superstitions and came to an absolute

standstill. Nevertheless, in the practical application of mathematics, the Japanese made gradual progress, and by the end of the 16th century the land survey and the construction of dikes, dams, and massive castles based on scientific principles began. SHIGETAKA MORI went to China to study mathematics, but because he had no official conection, he could not accomplish his purpose, and upon his return he appealed to HIDEYOSHI TOYOTOMI who sent him to China in an official capacity. Upon his return, SHIGETAKA taught mathematics in Kyoto and had several hundred pupils who were the sons of the rising tradesmen of Kyoto and Osaka. His treatise on the abacus, *Ki-jo ranchô*, is the first work on this subject in Japan, and he also improved and simplified the abacus and popularized it. He died in the beginning of the 17th century.

The publication of the *Jingô ki* by MITSUYOSHI YOSHIDA in 1627 marks the beginning of the development of higher mathematics in Japan. MITSUYOSHI was a pupil of SHIGETAKA, and following his master he departed from the Chinese, and using the abacus, worked out the most complicated mathematical problems. He can be called the father of Japanese mathematics. What MITSUYOSHI vaguely felt and suggested was developed into science by the genius of TAKAKAZU SEKI (1642-1708) who combined algebra, geometry and trigonometry in his *tensô-jitsu*.

The introduction of Western mathematics came soon after TAKAKAZU's death, but by this time his disciples continued the research started by him and except in the case of astronomy the new mathematical theory did not influence the Japanese till the beginning of the 19th century.

Mr. MIZUKI's work stresses the historical and biographical side of the development of Japanese mathematics rather than the theoretical development.

Library of Congress SHIO SAKANISHI

Jacques Boyer.—*Sûgaku-shi*, translated by TSURUICHI HAYASHI. x+230 p., 46 portraits, facsimiles and diagrams. 6th edition revised. Tokyo, OKURA, 1930 (in Japanese; yen 2.50).

In 1916 when a group of scholars undertook to edit a large and comprehensive series on mathematics entitled the *Sûgaku sôsho*, Dr. HAYASHI suggested that a history of Western mathematics be included in it. The task of choosing and translating it fell on him. The result is the translation of JACQUES BOYER's *Histoire des mathémathiques*. The original Japanese edition went through several printings, but it was destroyed in the earthquake of 1923. Therefore, a revised edition with many additional plates appeared in 1928, and within two years went through six editions. The translator in his preface laments the fact that there is no history of Japanese mathematics, and in translating this Western treatise,

he hopes to inspire a Japanese scholar to undertake this difficult but absolutely necessary task.

Library of Congress. SHIO SAKANISHI.

It is very strange that the Japanese mathematicians should have selected for translation JACQUES BOYER's *Histoire des mathématiques* (260 p., Paris, CARRÉ et NAUD, 1900), a book which is not only very elementary (that is not a defect) but second-hand, or rather *nth*-hand. However, is this not the usual fate of translations? It is a mistake to believe that it is the best books which are translated; it is neither the best nor the worst. In most cases the selection is not a true selection but a random choice. The translator gets hold of a book (it may be by mere accident), likes it well enough, and without consideration of other books on the same subject, decides to translate it himself or, if he command sufficient influence, to have it translated by others. The author of the French book was born in Paris in 1869, and is a distinguished scientific journalist. He cannot be called either a historian of mathematics or a historian of science. His book is not bad, but it was already out-of-date when it first appeared (in 1900!) and has no authority whatsoever.

GEORGE SARTON.

Robert Andrews Millikan, Duane Roller, and Earnest Charles Watson.—*Mechanics, Molecular Physics, Heat, and Sound.* XIV + 498 pag., 55 plates. Boston, GINN and Company, 1937. (Price $ 4.00).

The frontispiece of this book reproduces the Melancholia, a famous engraving of ALBRECHT DÜRER; and the authors of the book express the hope that they may be permitted to take the brooding figure, sitting amidst a litter of mechanical tools, scientific instruments, and mathematical symbols, as the embodiment of the spirit of physical science. This original introduction to a college textbook on physics gives an intimation of the artistry, historical scholarship, and profound philosophical conception of physics which are revealed in this remarkable text.

The present work was begun as a revision of an earlier textbook by the senior author, but the final result has been an entirely new book. It is a textbook for the first half of a two-year course in general physics, and in the opinion of the reviewer is the most adequate book of its sort in the field. But readers of *Isis* will be primarily interested in the fact that the book has been enriched by a wealth of historical material. Detailed references are given to original sources, many passages from classical works are quoted, excellent bibliographies are appended, but

above all, there are fifty-five plates depicting famous physicists, historical apparatus, physical laboratories and so forth. The book is a valuable contribution to the literature of the history of physics. It is a notable example of the humanization of science.

The reviewer offers only a few remarks in criticism. It is stated, "EMPEDOCLES held that matter consists of one primordial substance which is the habitat of four elementary properties—earth, air, fire, and water." (p. 199). It is more accurate to say that EMPEDOCLES taught that earth, air, fire, and water are primordial substances; ARISTOTLE developed these elements out of combinations of the primary properties, the warm and the cold, the dry and the moist. The treatment of NEWTON's third law of motion is unsatisfactory. The authors explicitly state that action and reaction act on different bodies, but they then explain equilibrium in terms of a principle which they obtain from the third law, namely, the work of the acting forces is equal to the work of the reacting forces. They correctly deduce the principle of moments for a wheel and axle from the principle that the work of the applied force is equal to the work of the resistance. But both forces act on the same body, and hence the condition of equilibrium is not deducible from the principle based on the concepts of action and reaction. The authors confuse reaction and resistance. The origin of the confusion is an ambiguity in NEWTON's own explanation of the law, which the reviewer has discussed in a separate note (*Isis* 27, 258-260).

University of California V. F. LENZEN

John Read.—*Prelude to Chemistry*. An Outline of Alchemy, its Literature and Relationship. New York, The MACMILLAN Company, 1937. Illustrated. xxvi + 328 pag. Price $ 5.00.

While Professor READ's book does not pretend to offer an exhaustive account of the early history of chemistry, it nevertheless succeeds admirably, better than any other single book with which we are acquainted, in conveying a correct understanding of the theories of early chemistry and alchemy, of their probable origins, of their nature and development, and of their affiliations. It is these affiliations, the extra-chemical involvements of early chemistry, which constitute its avowed subject-matter. Necessarily expounded in their relations to chemical and alchemical theories, they illuminate the theories with a light which cannot otherwise be thrown upon them. The book in consequence is characterized by an exceptionally accurate insight into the effective processes of the early history of chemistry. We see the continuity of ideas, not the discontinuous flickering of a series of biographies.

The author says in the Proheme that "Alchemy was pictorial in its

expression to a degree which is not realized in this age, and that is why this new *Viridarium* is so fully illustrated. The woodcuts and copper-plate engravings which adorn so many alchemical treatises bear eloquent testimony to the artistic talent and skilled craftsmanship of the early workers in these alluring media. Like much of the early printing, they carry the impress of fresh minds and eager hands upon a new art. Pictorial alchemy offers indeed many attractions, and possibly some lessons, to the modern chemist who glories in the compact expressiveness of the chemical formula...

" It is sometimes said that an increasing tendency of modern science to exalt the importance of ' learning more and more about less and less ' is likely to produce a condition of intellectual myopia in the scientific specialist. If this be so, it is difficult to imagine a more stimulating and picturesque corrective than the development of an interest in historical science. ' It is only when science is explained and tempered by history that it acquires its whole educational value, and that the main objections to scientific education cease to be valid. The more science enters into our lives, the more it must be " humanized," and there is no better way to humanize it than to study its history. Such studies, reconciling the purely scientific, the historic, and the philosophic points of view, would be the source of the soundest and highest idealism.'" (1)

The Epilogue concludes as follows—" As our brief wanderings in the vasty fields of alchemy have shown, alchemy was something more than an ancient art which gave rise after long centuries to the modern science of chemistry. It was a complex and indefinite aggregation of chemistry, philosophy, religion, occultism, astrology, magic, mythology, and many other constituents. It was a strange blend of logical thinking and mystical dreaming, of sound observation and wild superstition, of natural and moral ideas, of objective facts and subjective conclusions.

" The sympathetic student in search of the true significance of alchemy cannot but absorb something of the romance and wistfulness of the age-long struggle of this ' Divine Art ' after the unattainable ; nor can he remain unmindful of the immemorial traditions of alchemy's daughter, chemistry. ' Pray, read, toil—and thou shalt find,' was the guiding motto of the adepts ; and, at its best, alchemy was a prayerful search after truth, in the light of that principle of the unity of matter which has been rediscovered by modern science. Let us go forward in the hope that time by degrees will bring forth a corresponding unity of heart which will act as an elixir of life in the regeneration of the nations."

(1) G. SARTON in *Science* (45, 284, 1917) as quoted (or rather unquoted) by the author (Editor).

The first chapter, " An Outline of Alchemy, " discusses briefly the difficulty of defining alchemy, the evidences for its Chinese origin, the early practice of metallurgy in Egypt, the imitative arts of the Alexandrian chemists and the " transmutation by color " theory of HOPKINS, the Islamic era, the European era, and the era of phlogiston. READ recognizes that the central idea of alchemical and early chemical theory is far older than Greek philosophy. " The Sun-god and Moon-goddess ; Yang and Yin ; masculine and feminine ; sulfur and mercury ; positive and negative ; proton and electron : truly it may be said of chemical theory that the more it changes the more it is the same thing !... How many chemists realise that phlogiston was a direct descendant of Osiris, the Sun-god of ancient Egypt ! "

The second chapter on " The Literature of Alchemy " contains sections on alchemical manuscripts, the "Sum of Perfection," the Emerald Table of HERMES, the " New Pearl of Great Price," the alchemical pictures of NICHOLAS FLAMEL, the *Splendor Solis*, early practical chemistry (distillation and metallurgy), alchemical literature of the seventeenth century, symbols, emblems, and cryptic expressions, the hylozoistic conception in alchemy, the relations of alchemy to astrology, the masculine and feminine principles, and the religious element in alchemy.

The third chapter discusses the Philosopher's Stone in a manner which makes intelligible the language, the diagrams, and the symbolic pictures by which the alchemists were accustomed to represent its preparation and properties.

The fourth chapter describes the " Hermetic Museum " and MICHAEL MAIER, editor of the *Tripus Aureus*, and two of the " three nurslings of the wealthy art ", THOMAS NORTON and JOHN CREMER who are represented by tracts in MAIER's collection. The fifth chapter discusses the third member of the triad, BASIL VALENTINE, and his " Triumphal Chariot of Antimony, " his " Last Will and Testament," and " Twelve Keys."

The sixth chapter deals chiefly with the musical alchemist, Count MICHAEL MAIER, and with the emblems which illustrate his writings, particularly the *Atalanta Fugiens* which contains both symbolic pictures and alchemical music. The seventh and last chapter discusses the *Viridarium Chymicum* and *Hortulus Hermeticus Flosculis Philosophorum* of STOLCIUS and the *Philosophia Reformata* of MYLIUS, and compares their emblems with those of MAIER. READ finds that all of STOLCIUS' emblems from I to XCIII may be " traced back to works published by LUCAS JENNIS at Frankfurt, between the year 1618 and 1622, and written by MAIER or MYLIUS."

An Appendix contains an essay on " The Music in *Atalanta Fugiens* "

by F. H. SAWYER, together with several of the fugues arranged in the modern manner for choral singing—also a Glossary, and Bibliography and Notes. The book is profusely illustrated; it has a colored frontispiece, 63 other plates, 17 figures, and additional small pictures. " The Garden has been arrayed to lure BEES and BUTTERFLIES alike; but it may be added that a flowery Border, metamorphosed after the manner of alchemy into a bibliography, garnishes the outgoing Arbour. Moreover divers faire Rose-trees, transmuted into cross-references, have been planted in the middest of the Garden. The *Butterflies*, as they list, may hover over these blossoms without settling thereon; but peradventure the *Bees* will find them as full of Honey as of Fragrance." The author is Professor of Chemistry and Director of the Chemical Research Laboratory, St. Andrews, Scotland.

TENNEY L. DAVIS.

Armand Delatte.—*Herbarius, recherches sur le cérémonial usité chez les anciens pour la cueillette des simples et des plantes magiques.* Paris, 1936. Reprinted from *Bulletin de l'Académie royale de Belgique* (Classe des Lettres) 22 : 227-348, (1936).

The ancient agriculturalists, philosophers and pharmacologists had what we would today call an organismal theory of the cosmos. The various parts of the universe seemed to be united to the whole by mysterious forces so that anyone who offered violence to any natural object did so at a considerable personal risk. Thus the gathering of herbs or the digging of roots from the bosom of Mother Earth was considered vaguely analogous to pulling hairs from the back of a sleeping tiger, a dangerous occupation unless proper precautions were observed. The herbs were needed, however, for food, drugs and for magical and religious rites and so the risks had to be taken, but the risks could be minimized supposedly by appropriate ceremonies. M. DELATTE, whose *Anecdota atheniensia* (1927) and *La catoptromancie grecque et ses dérivés* (1932) have been reviewed previously in *Isis* (12 : 328-330, 20 : 478-480), has recorded these ceremonies in a clear, detailed and fully documented contribution, a work which should be required reading for any student of the history of drugs and simples, for M. DELATTE's descriptions of these ancient rites is a very real aid in a study of the earliest or High Church period of pharmacology.

Not all of the ceremonies which accompanied the gathering of herbs were designed to propitiate the disturbed forces of nature. Supposedly some of the rites preserved or even augmented the desired properties of the various plants. Thus certain herbs were gathered only at night so that they might retain the beneficent effects of astral radiations.

Others, for example the mulberry (*Morus sp.*), were gathered only at the full moon. Still others (*Artemesia dracunculus, etc.*) were harvested during the waxing moon, and of course some (*Polygonum, etc.*) when the moon was waning. Many plants used in magic were surrounded by a magic circle before they were gathered. Often the herb gatherer himself had to be ritualistically purified and the gathering itself done with appropriate gestures and prayers.

Many of the ceremonies persisted for very long periods and were modified but slightly when Christianity replaced Paganism, the Saints or demons in some instances assuming the role of the earlier classical Deities. It would be interesting to know how many of these rites, which probably flourished during neolithic times, still persist in peasant communities and to discover incidentally the origin of many of the practices in folk medicine. It may not be amiss to raise the question as to how long some of these ancient beliefs persisted in higher circles. The sixteenth century Herbals certainly contain some odd remedies and old editions of the Pharmacopoeia make appalling reading.

Most botanists will find M. DELATTE's book of great interest. But one of his conventions is decidedly irritating. Since the time of Linnaeus plants have had precise, scientific names. Not once does M. DELATTE use these botanical terms; he cites the herbs only in French. While it is true that the names of plants in French are not as ambiguous as they are in certain other vernaculars, the inclusion of their scientific names would be a real convenience to biologists.

CONWAY ZIRKLE.

Ørjan Olsen.—*De store opdagelser.* 6 Bände in 8vo., insgesamt 1950 Seiten, mit einem Bildnis des Verfassers und zahlreichen Illustrationen. Oslo, Nasjonalforlaget A. S., 1929-31 (in norwegisch).

Im Jahre 1879 trat der durch seine Zukunftsromane bereits zur Weltberühmtheit gewordene JULES VERNE mit einem umfangreichen Werk betitelt „Découverte de la Terre", an die Öffentlichkeit, das nicht der Zukunft, sondern ausschliesslich der Vergangenheit gewidmet war, indem es eine fesselnde Darstellung der Geschichte der grossen Entdeckungen bot. Der Erfolg dieses neuartigen Werkes JULES VERNES stand dem seiner phantastischen Schriften in nichts nach, und innerhalb weniger Jahre lagen Übersetzungen in verschiedenen Sprachen vor. Erstaunlicherweise war es damals Norwegen, das den Schnelligkeitsrekord gewann: Noch im Jahre 1879 selbst erschien der erste Band des JULES VERNESchen Werkes in P. T. MALLINGS Boghandels Forlag, Kristiania, übersetzt von

B. GEELMUYDEN (1), 1880 folgte der zweite, 1883 der dritte; die Aufnahme in Norwegen und Dänemark war überaus günstig, und lange Jahre hindurch erfreute das Werk sich allgemeiner Beliebtheit.

Genau fünfzig Jahre nach dem Erscheinen des französischen Originals und des ersten Bandes der norwegischen Übersetzung, legte der Nasjonalforlag in Oslo dem norwegischen Publikum die 3 ersten Bände eines neuen Werkes über die grossen Entdeckungen vor, für dessen Bearbeitung er Dr. ØRJAN OLSEN gewonnen hatte. Der vom Verlag ausgearbeitete Plan des Werkes legte dem Verfasser erheblichen Zwang auf; insbesondere gestattete ihm die äusserst kurz bemessene Frist nicht, in allen Fällen die Originalquellen zu konsultieren. Wenn jedoch der Verfasser im Vorwort zum 1. Band sagt, sein Werk mache weder hinsichtlich des Stoffes noch seiner Anordnung irgendwelchen Anspruch auf Originalität, so dürfte dies doch als zu grosse Bescheidenheit zu bezeichnen sein. Tatsächlich ist das Werk, dessen letzter Band bereits im Jahre 1931 erschien, keineswegs nur eine Kompilation aus früheren Arbeiten anderer Autoren: vielmehr folgt der Verfasser in vielen entscheidenden Punkten durchaus seinen eigenen Intentionen und weicht hiermit vom Althergebrachten ab. Was jedoch vor allem anderen den Stempel der Originalität verleiht, ist die stilistische Souveränität der Darstellung. Es ist ein wahres Vergnügen, den packenden Beschreibungen der Reisen, der fremden Länder und Völker und der verschiedenartigsten Kulturen zu folgen, und die stattliche Anzahl von annähernd 2000 Seiten erscheint zuguterletzt dem Leser eher zu klein als zu gross. Sebstverständlich lassen sich an manchen Stellen kleine Ungenauigkeiten nachweisen [so sollte z. B. der Name des Schülers von FRANZ VAN ASSISI nicht — wie auch in anderen Werken häufig zitiert — „GIOVANNI PIANO DEL CARPINI", sondern besser „FRA GIOVANNI DAL PIAN DEI CARPINI" lauten (Bd. 1, S. 293)], aber nirgends findet man grobe Irrtümer, die dem Leser ein schiefes Bild der geschilderten Ereignisse vermitteln. In manchen Fällen allerdings erscheint die Darstellungsweise etwas zu sehr aufs Anekdotenhafte abgestimmt; dies würzt zwar die Lekture, trägt jedoch nicht genügend zur Aufhellung des Sachverhaltes bei.

Jedem Band des Werkes ist ein ausführliches alphabetisches Stichwortregister beigefügt; der letzte Band, der bis zu den arktischen und antarktischen Expeditionen des letzten Jahrzehntes führt, enthält überdies ein 34 Seiten umfassendes chronologisches Verzeichnis der bedeutendsten Entdeckungen, nach Weltteilen geordnet, das zu interessanten Vergleichen anregt.

Einer oberflächlichen Schätzung zufolge beläuft sich die Zahl der in

(1) "De store Reisers og de store Reisendes Historie eller *Jordens Opdagelseshistorie* fra de ældste Tider til Udgangen af det 17de Aarhundrede.„

den Text eingestreuten Illustrationen und Kartenskizzen auf weit über 1000. Die Qualität der Bilder ist allerdings äusserst ungleichwertig. Viele ausgezeichnete Photographien sind vom Verfassr selbst an Ort und Stelle aufgenommen: daneben jedoch sind zahlreiche uns heute reichlich altertümlich anmutende Zeichnungen aus dem vorerwähnten JULES VERNEschen Werk übernommen. Hier wäre wohl eine etwas kritischere Auswahl am Platz gewesen.

Zum Schluss eine vergleichende Betrachtung: JULES VERNES „Découverte de la Terre" wurde unmittelbar nach seinem Erscheinen aus dem Französischen ins Norwegische übersetzt. Nach einem halben Jahrhundert inspiriert es den Norweger ØRJAN OLSEN zu einer neuen Behandlung des packenden Stoffes, und nunmehr schliesst sich der Ring: Unter dem Titel „La conquête de la terre" erscheint zur Zeit eine vollständige französische Übersetzung des ausgezeichneten OLSENschen Werkes im Verlag PAYOT, Paris (1. Band 1933; 2. und 3. Band 1934; 4. Band 1935). Es wäre sehr zu wünschen, dass das Werk bald auch dem deutschen und englisch-amerikanischen Publikum durch Übersetzungen zugänglich gemacht würde!

Harvard University. WILLY HARTNER.

V. Gordon Childe.—*Man Makes Himself.* xii + 275 pag. London: WATTS and Co., 1936 (7/6).

Professor CHILDE, who has already put so many of us into his debt by his exemplary studies in prehistory, with the present volume will increase the number of his debtors inestimably. *Man Makes Himself* is a popularly written account of the origin and development of human progress and civilization as a prehistorian sees it,—a prehistorian, however, with a difference, for Professor CHILDE is very much alive to the lessons which are to be learned from the history of mankind's early achievements, as well as to the value of those lessons for the proper understanding and analysis of our own social structure. The story which the author has to unfold is told in such a way that it can leave the reader with no other impression than that human civilization and progress owe their origin to the operation of economic factors, their interaction and their complication. In a certain sense this book represents a more convincing exposition of the Marxian thesis than even *Das Kapital* itself. From the palaeolithic to the cultures of Babylon and Egypt Professor CHILDE shows how in response to practical economic needs, man developed his culture, his knowledge, and his civilization. Shall we inquire into the origin of the palaeolithic scraper, a neolithic wall-painting, a Bronze-Age dagger, a Sumerian ideogram, Egyptian hieratic script, arithmetic, geometry, astronomy, the calendar, the clock, medicine,

science? The answer is in all cases the same: these things are at once the expression and the response to economic needs.

Now, no one would deny the immense role that economic factors have played in the development of civilization and in the progress of mankind from the level of the very primitive to a condition such as that which characterizes present Western civilization, but to attribute that rise and progress chiefly to the operation of one factor, complex as that one factor is, seems to me unnecessarily to simplify the issues involved. No doubt the archaeologist and prehistorian cannot but help be impressed with the material aspects of the cultures and peoples whose economic remains alone he can for the most part come to know, but to assume that these peoples were of the species *Homo economicus* because the only remains we know them by are of a material nature is to exhibit a one-sidedness of judgment which is—or, at least should be,—as obviously wrong as it is insensible to the demonstrable fact that the economic is but one link in a chain of causes and effects of which it is more often than not in the relation of effect rather than of cause. If in our own civilization we see the predominance of economic motives and functions, and if in the Marxian analysis of that civilization we see the most cogent analysis of it that has thus far been made, we shall not, I think, be greatly in error, but whereas our own civilization is now for the most part governed and determined by constricting economic pressures, the civilizations of early man, on the other hand, determined the nature of their economic functions. Thus, existing so-called primitive cultures are social structures in which the economic functions are performed in the service of the individual—as among the food-gatherers—or else in the service of the group—as among most agriculturalists and herding peoples. To say of such cultures that they are 'economically determined' would be egregiously untrue in the same sense as it would be untrue to say that they are environmentally determined. Each culture is determined by conditions peculiar to itself, and these are multiple and complex, and the economic is only one of them. If we are to discover the role which the economic factor plays or has played in any given society or societies we shall not be much assisted if we concentrate our attention upon the economic factor alone, but we must take into the scope of our consideration every element which gives the society we are studying its form, for the social is not an entity but a relation. Professor CHILDE believes it to be an economic relation, and in tracing the development of civilization it is only this relation which he sees. It is agreed that with the rise of Egyptian or Sumerian or Babylonian urban civilization the economic relation begins to play a considerable part in determining the structure and the functioning of society, but

is it sensible to make no mention of the non-economically determined contributions to that same structure and functioning? In these societies is not the economic still a part of the social? And is not this the important point? Perhaps this is a minor point in view of Professor CHILDE's laudable attempt to trace the origins of our own economic dilemma, yet in the interests of clear thinking in a field which is destined to occupy a position of central importance in the discussion of the foundations of our own civilization, it is desirable that the point should be made. The overemphasis of the economic thesis can, however, do no great harm, on the contrary, if it leads to the critical examination of the evidence, as I am sure it will, much good will have come of it, but it is high time that the matter were raised.

I hope that I have not conveyed the impression that Professor CHILDE's book was being, as the venerable Dr. SPOONER would have said, praised with faint damns, for Professor CHILDE's book is by far and away the best treatment of its subject which has thus far made its appearance—with the reservations already made. Certainly the book is one which all who are in any way interested in the process by which man has come to make himself cannot neglect to read.

Apart from a number of unimportant typographical errors, Professor CHILDE's morphological references are not always happy. The Mousterians, for example, were no more bestial looking than the Australians of to-day, and *they* are far from being so; the Neanderthalians certainly did not walk with a shuffling gait, nor is it true that they could not hold their heads erect; the attachments of the tongue muscles have absolutely nothing to do with the ability to speak; and it is quite untrue that the skull determines the size or development of the brain. Since these things are none of them matter of opinion, Professor CHILDE's statement of them should be modified in a future edition of his book. Professor CHILDE's references to purely ethnological and linguistic material are occasionally unsatisfactory, but they do not seriously affect his main exposition.

New York University. M. F. ASHLEY-MONTAGU.

Arturo Castiglioni.—*Storia della medicina.* xxxii + 825 pag. Milano, A. MONDADORI, 1936.

The first edition of this excellent work was published at Milan in December 1927, a French translation of the work made its appearance in 1931 at Paris and this was favourably reviewed in these pages by Dr. SARTON (*Isis*, XVI, 468-471). The present edition represents a virtually new work, having been thoroughly revised, amplified, and brought up to date. The book is extremely well printed, serviceably

bound in half-morocco, and illustrated with 442 admirably well chosen figures. In addition there are 8 coloured plates so well reproduced that they must surely vie with the originals for beauty; the reviewer has rarely seen such good colour reproduction between the covers of a book, or even outside them; these colour plates are really something extraordinary. MONDADORI the printer as well as the publisher of this work is to be congratulated upon the excellence of his achievement, and the author felicitated upon his publisher.

The text of the book is no less excellent than its format; *Storia della medicina* is, in fact, the best history of medicine available in any language. CASTIGLIONI is Professor of the History of Medicine in the University of Padua, the author of some twelve volumes of studies in the history of medicine, and a frequent contributor to the scientific periodicals on the same subject, as readers of *Isis* will already know. His qualifications for writing a history of medicine are therefore excellent, and these have been assisted by a nice sense of the value of words, and as already indicated a very happy appreciation of the right figure wherewith to illustrate the text. The text runs to about half a million words, and something of its exhaustiveness may be indicated by stating that considerably more than 3000 individuals are referred to by name, and their place in the history of medicine clearly stated. The book is, however, no mere biographical compendium, but a straightforward narrative account of the rise and progress of medicine from the earliest times to the latest, in which men and events are woven into their proper relation to time, place, subject, and society. Hence it is that the book may be read continously from the first page to the last, as one would read Professor CHARLES SINGER's delightful *A Short History of Medicine* (Oxford, 1928), and this is saying a great deal for so large a work, it is an achievement. As a work of reference it surpasses GARRISON, and that, too, is saying a great deal. The book is easy to handle and one can rely upon finding the essential points relating to any individual or event that one may, within reason, be seeking; the excellent bibliographies at the conclusion of each chapter provide the reader with a selection of works in which he may find further information.

The scheme of the book may be gathered from the titles of its twenty chapters. Medical Thought in its Historical Evolution—The Origins of Medicine in Prehistoric Times and Among Primitive Peoples—The Medicine of the Peoples of Mesopotamia—The Medicine of the Ancient Egyptians—The Medicine of the People of Israel—The Ancient Medicine of Persia and of India—The Medicine of the Peoples of the Far East—The Medicine of Ancient Greece—The Golden Age of Greek Medicine—Post-Hippocratic Medicine—Roman Medicine—The Deca-

dence of Scientific Medicine—The Medicine of the Arabs—The Medicine of the Christian Occident During the Early Centuries of the Mediaeval Period—Medicine in the Last Centuries of the Mediaeval Period—The Renaissance—The Sixteenth Century—The Seventeenth Century—The Medicine of the Eighteenth Century (First Period)—The Medicine of the Eighteenth Century (Second Period) and of the Nineteenth Century.

Professor CASTIGLIONI's treatment of prehistoric medicine and the medicine of primitive peoples leaves something to be desired. It is far too general and leans too heavily upon sources like FRAZER and WUNDT, but the subject is a difficult one. The last chapter of the book is somewhat disproportionately overweighted with Italian names, a fact which is by no means accidental, for the author states in his preface that his documentation of the contributions made by Italian scientists to medical progress constitutes a notable feature of the present edition. Perhaps in view of the immediately following remarks about the " grande opera creata dal Governo italiano nell'ultimo decennio " the cause of this overweighting is not far to seek. It is a pity, for the last chapter of this book is quite lopsided.

There is a very good general bibliography of ten pages, an index of names, and an index of notable matters.

An English translation of this work would be a great boon to those without a knowledge of the language in which it is written.

New York University M. F. ASHLEY-MONTAGU.

Richard H. Shryock.—*The Development of Modern Medicine: An Interpretation of the Social and Scientific Factors Involved.* University of Pennsylvania Press, Philadelphia, 1936, xv + 442 pag., frontispiece and 7 illustrations. Price $ 4.00.

The title of this interesting volume is a little misleading. As Dr. SHRYOCK states in the preface: " This is in no sense a study in the technical history of medicine, but is rather an attempt to portray certain major aspects of medical development against the background of intellectual and social history in general." Dr. SHRYOCK might have added that the attempt is limited to the last three centuries. Mostly he is concerned with the interrelations ot social and intellectual forces with progress in public health.

The chapter headings give a clear indication of the scope of the work: I. First Attempts to Establish a Physical Science, 1600-1700; II. The Partial Failure of Physical Science, 1700-1800; III. Social Factors in Medical Lag After 1700; IV. Renewed Progress Toward an Objective Science, 1750-1800; V. Early Contributions of Physics and Physicians to the Public Welfare, 1750-1800; VI. Science in a Romantic Age,

1800-1850; VII. Medicine and "The Basic Sciences"; VIII. Medicine, Mathematics, and the Social Sciences; IX. The Emergence of Modern Medicine, 1800-1850; X. The Influence of French Medicine in Europe and America; XI. Modern Medicine in Germany, 1830-1880; XII. Medicine and the Public Health Movement, 1800-1880; XIII. Public Confidence Lost; XIV. The Triumphs of Modern Medicine, 1870-1900; XV. Further Progress and Some of the Consequences; XVI. Public Confidence Regained; XVII. A Delayed Advance Against Mental Disease; XVIII. Practice in a Changing Society, 1880-1930; XIX. American Experience, and XX. Some Contemporary Questions.

In tracing the interrelations of medicine and social movements during the last three centuries, there is necessarily much repetition of argument and idea. But Dr. SHRYOCK has skillfully interwoven such personal notes regarding contributors to medical theories and to social viewpoints that the interest of the reader is maintained. An important aspect of the book is the analysis of scientific and medical theory and the factors concerned in the modification of such theories. Much attention is given to the difference between the rationalistic and empirical approach to medical practice. Of as early a period as the 17th century it could be said for medicine that "So many facts were already known that it was difficult to handle them; yet more must be acquired before a synthesis could be achieved." This seems to be a dilemma which will always face not only medicine but probably all other scientific efforts as well. The difficulty is that such a situation promotes speculation on the part of impatient and often unqualified writers. Dr. SHRYOCK points out how failure to recognize specialties in medical practice seriously delayed specialization in medical research. On the other side of the problem is the tendency for a high degree of medical specialism to interfere with effective care for the sick.

Dr. SHRYOCK's work is exhaustively documented, and he seems to have covered all important material relating to his studies. There are a few errors. SIMPSON introduced chloroform anesthesia in 1847, not 1851. It is suggested that the anesthetic properties of ether were already popular knowledge by the time of LONG's use of ether in 1842. There was really no popular appreciation of any effect of ether except an inebriating one before LONG's use of it in a surgical operation. These are trivial matters. The book clearly indicates the important effect of social conditions on the progress of science in medicine. It also shows how significant the medical point of view may be in determining the lines along which social welfare may proceed. The bibliographical material is in footnotes. There is a good index.

University of California C. D. LEAKE.

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Special pains have been taken to include in this index, as in the previous one, the names of every person whom some information may be found. Casual references have been omitted. LÉON GUINET.

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